PROCTOLOGY NUMBER

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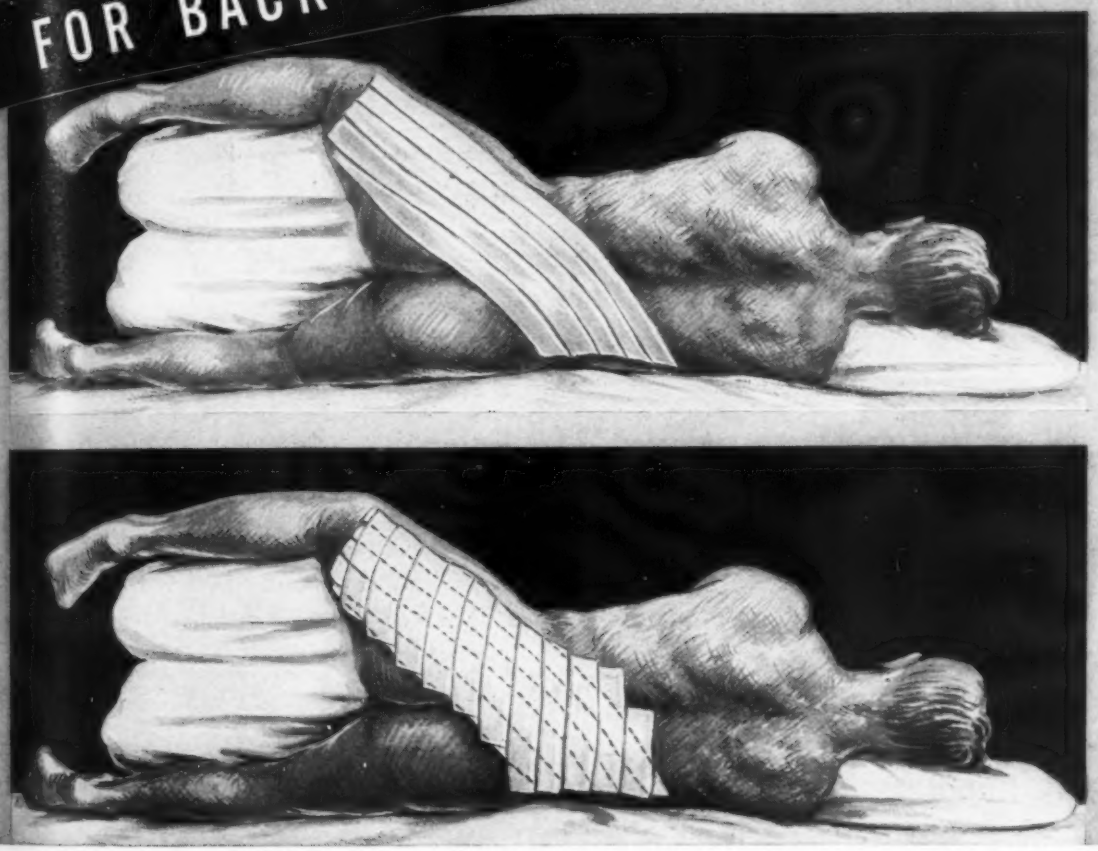

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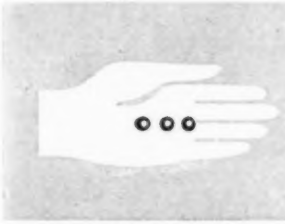

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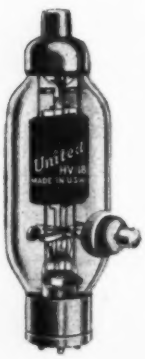

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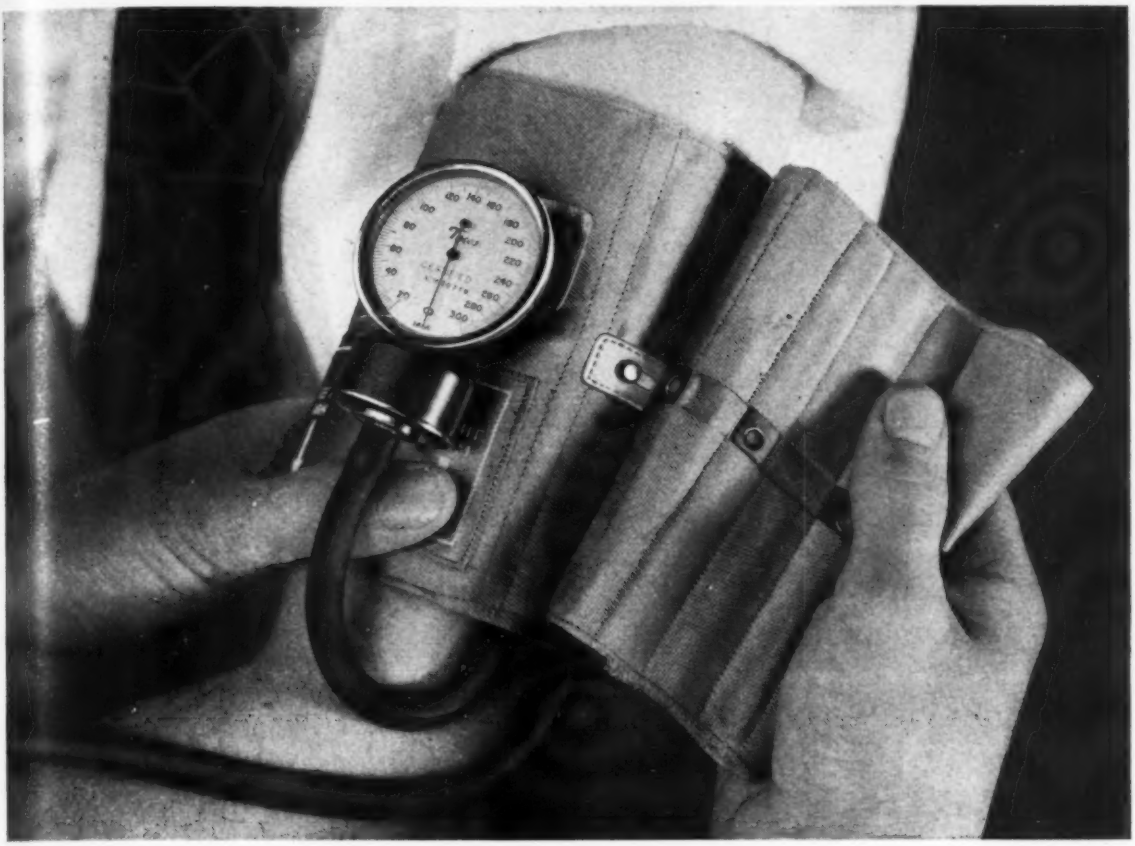

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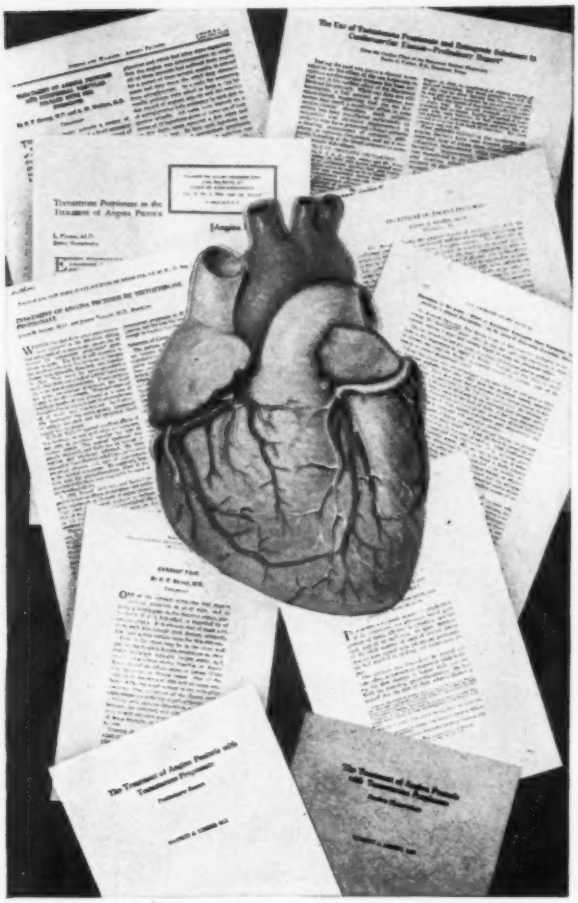

CIBA BULLETIN No. 1
on
EXPERIMENTAL
HORMONE THERAPY

In the past few years a growing group of clinicians has been reporting gratifying results in the treatment of anginal patients with the androgen, testosterone propionate. Results have been noted after 6 to 8 weeks therapy.

Findings reported . . .

Exercise and emotional tolerance improved.[1]

Beneficial effects persisting 2 to 13 months.[2, 3]

. . . and in addition literature indicates intermittent claudication diminished or abolished, improvement in Buerger's disease, peripheral blood supply improved[4], vasodilatation effect on coronary vessels[5].

The massing of favorable reports in this experimental indication warrants consideration and use of testosterone propionate in anginal syndrome.

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MOST POTENT ANDROGEN

Available . . .

Ampuls 1 cc containing 5 mg.
Ampuls 1 cc containing 10 mg.
Ampuls 1 cc containing 25 mg.

Perandren—*Trade Mark Reg. U. S. Pat. Off.*
Denotes Ciba's Testosterone Propionate.

BIBLIOGRAPHY

(1) Walker, T. C.: Jl. Clin. Endocrinol., 1942, ii, 560-568.

(2) Lesser, M. A.: New England Jl. Med., 1942, ccxxvi, 51-54.

(3) Lesser, M. A.: New England Jl. Med., 1943, ccxxviii, 185-188.

(4) Edward, E. A., et al: New England Jl. Med., 1939, ccxx, 865.

(5) Bonnell, R. W., et al: Ohio State Med. Jl., 1941, xxxvii, 554.

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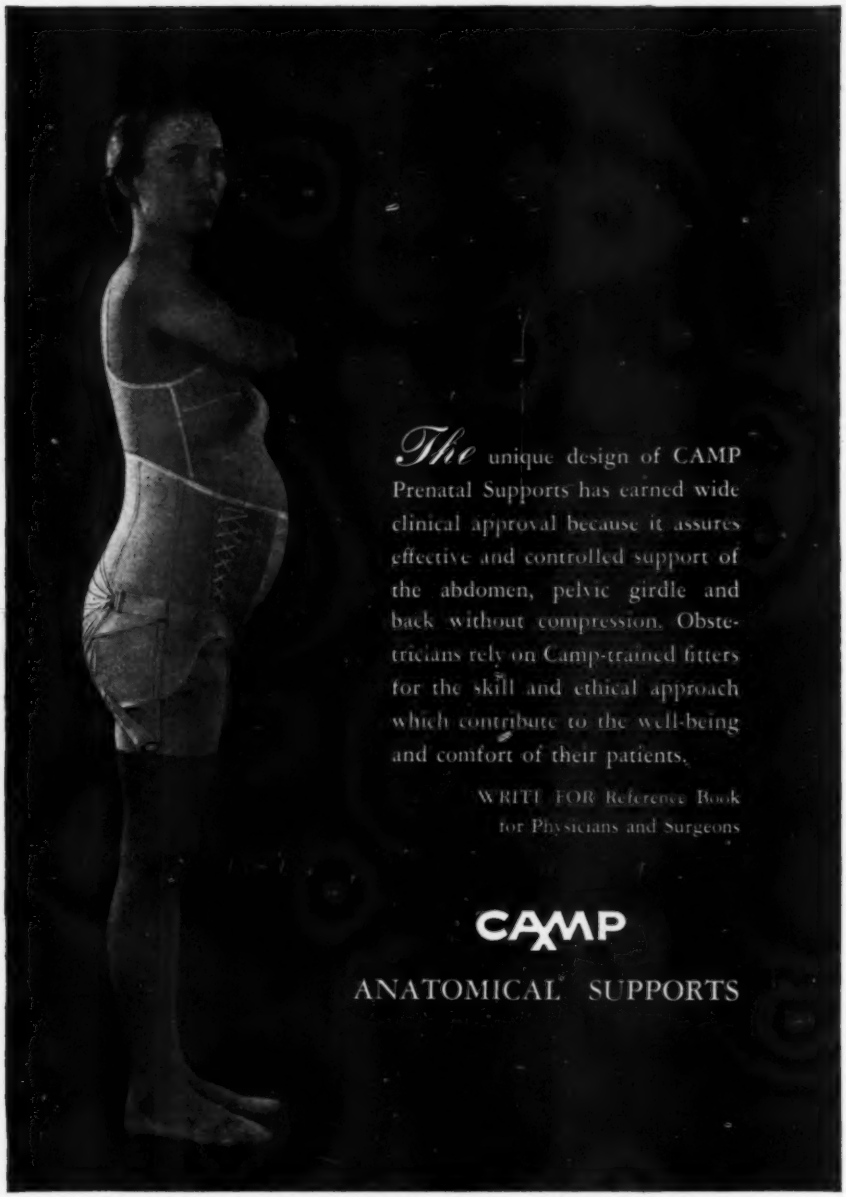
In Canada: **Ciba Company Ltd., Montreal**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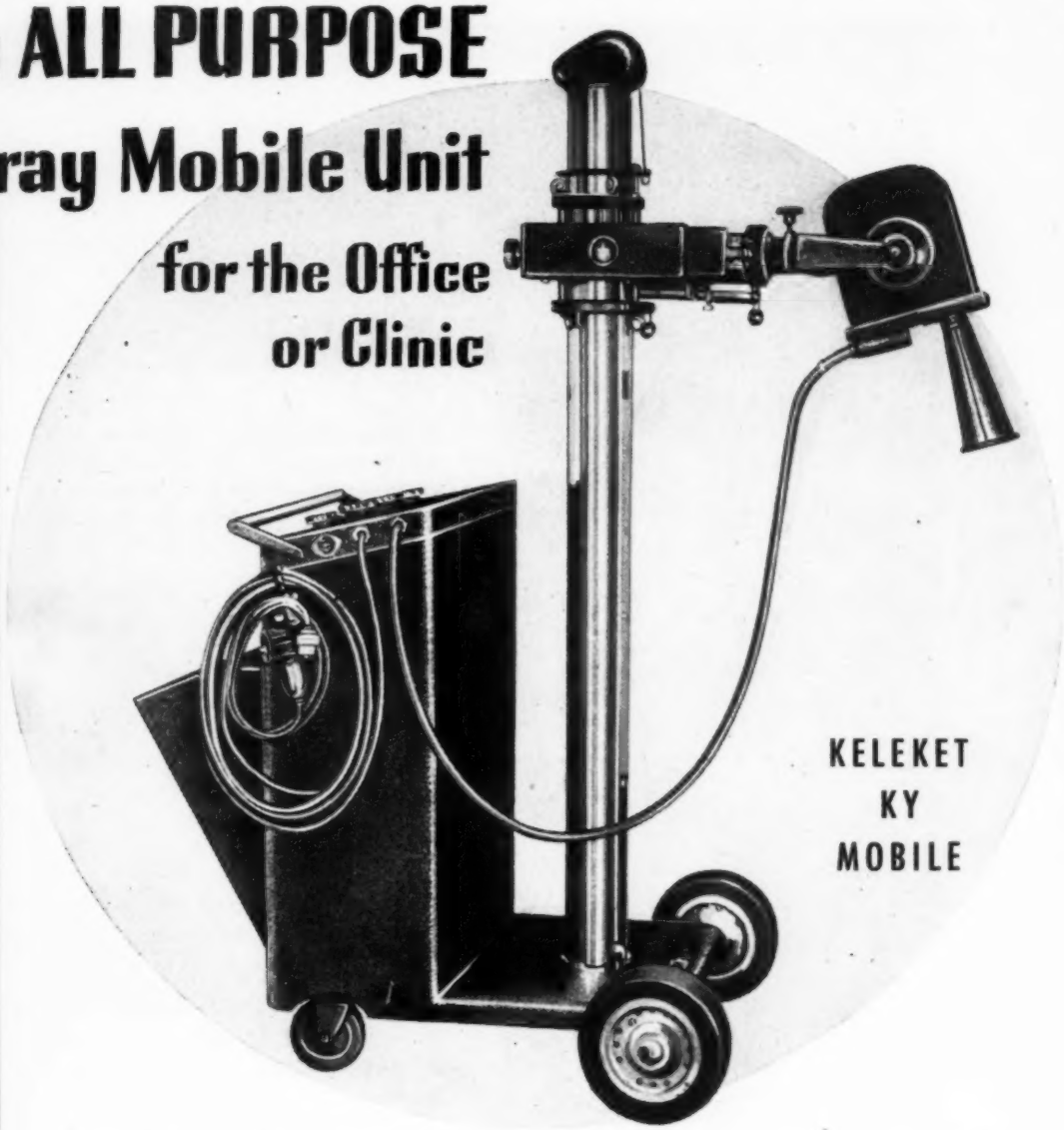

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THE Kelley-Koett Manufacturing Co.

KELEKET-THE FINEST TRADITION IN X-RAY

2371 I WEST FOURTH ST., COVINGTON, KY.

Because there is

*Margolis, H. M.: Diagnosis and Treatment of Arthritis and Allied Disorders, New York, N. Y., Paul B. Hoeber, Inc., 1941, p. 59.

Virtually all recently published reports dealing with the treatment of arthritis stress the therapeutic value of *all* the essential vitamins in the management of arthritic patients.

Vitamin D Many investigators have reported beneficial results from the use of massive dosage of vitamin D in rheumatic disorders. In practically all of these reports, however, the need for adequate amounts of *all* the essential vitamins is stressed.

Vitamin A The need for large amounts of vitamin A by arthritic patients is based on the observation that arthritics require from 4 to 10 times the quantity of vitamin A usually ingested in the average diet, hence the frequent occurrence of vitamin A deficiency symptoms in arthritic patients.

Each Capsule Contains:

Vitamin D (Irradiated Ergosterol)	50,000 U.S.P. Units
Vitamin A (Fish-Liver Oil)	5,000 U.S.P. Units
Ascorbic Acid	75 mg.
Thiamine Hydrochloride	3 mg.
Riboflavin	2 mg.
Pyridoxine Hydrochloride	0.3 mg.
Calcium Pantothenate	1 mg.
Niacinamide	15 mg.
Mixed Natural Tocopherols	3.4 mg.

(Equivalent in biological activity to 3 mg. of Alpha Tocopherol)

striking evidence of nutritional abnormalities...*

Vitamin B COMPLEX

Thiamine, Riboflavin, Pyridoxine, Calcium Pantothenate. That relatively large amounts of the B complex vitamins are required in the treatment of chronic arthritis has been reported by many rheumatologists. Characteristic B complex deficiency symptoms frequently encountered in arthritic patients not only unfavorably affect the course of the arthritic process, but also add to the discomfort typical of the syndrome.

Vitamin C

In patients with chronic arthritis the requirement of vitamin C is greatly increased. Abnormally low blood levels of vitamin C have been observed frequently in arthritic patients.

Vitamin E

Beneficial results have been obtained with vitamin E when fibrositis complicates the arthritic involvement. Since involvement of the soft tissue is almost the rule in arthritis, vitamin E finds a rightful place in the management of these patients. Vitamin E is known to be involved in the metabolism of skeletal muscle.

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Darthronol presents—in one capsule and in correlated indicated potencies—these nine vitamins which many investigators assert play an important role in the management of the arthritic patient.

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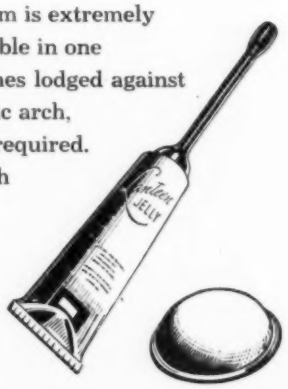

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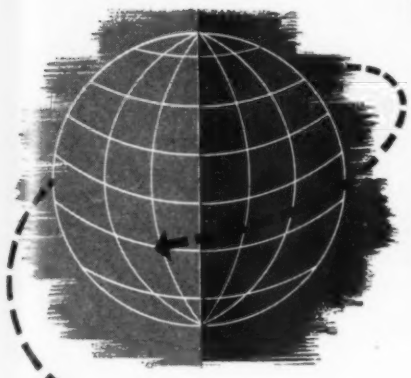
and effective blood levels for



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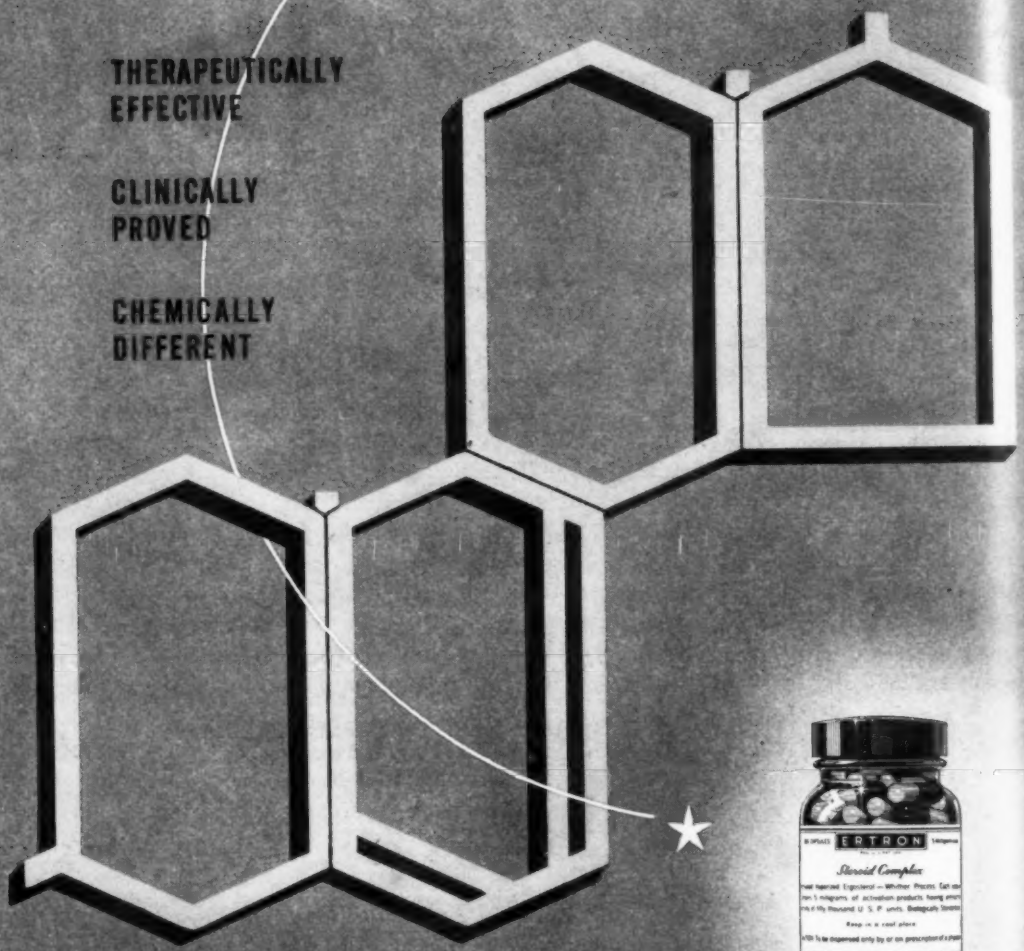

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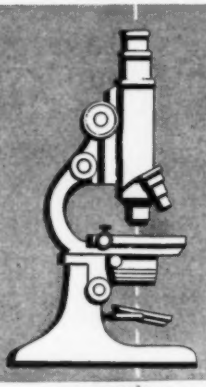
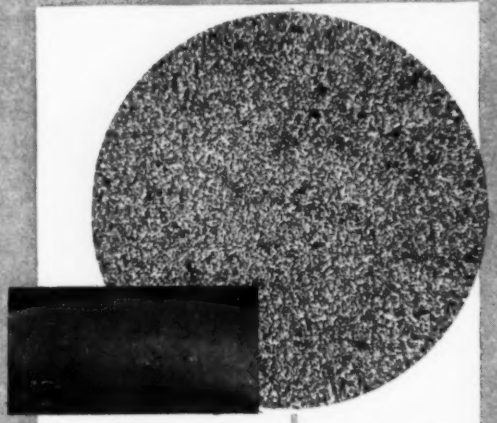
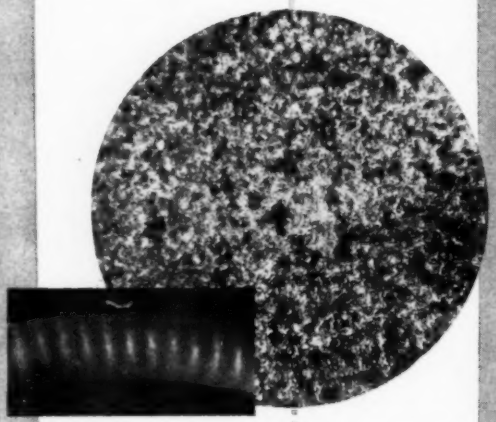


Through the MICROSCOPE



No. 1 Unretouched photomicrograph of the dome (enlarged 10 diameters) and the rim (inset) of a "RAMSES" Flexible Cushioned Diaphragm.



No. 2 Unretouched photomicrograph of the dome (enlarged 10 diameters) and the rim (inset) of a conventional-type diaphragm.

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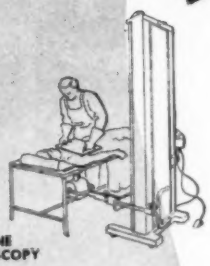

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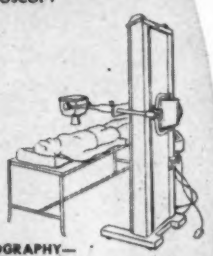

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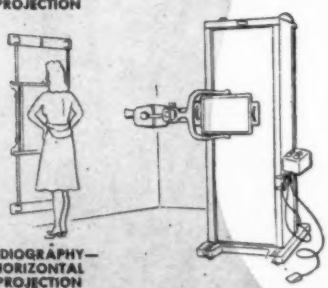

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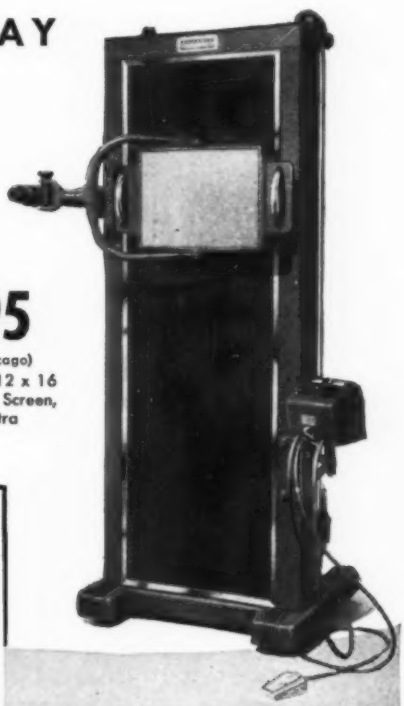

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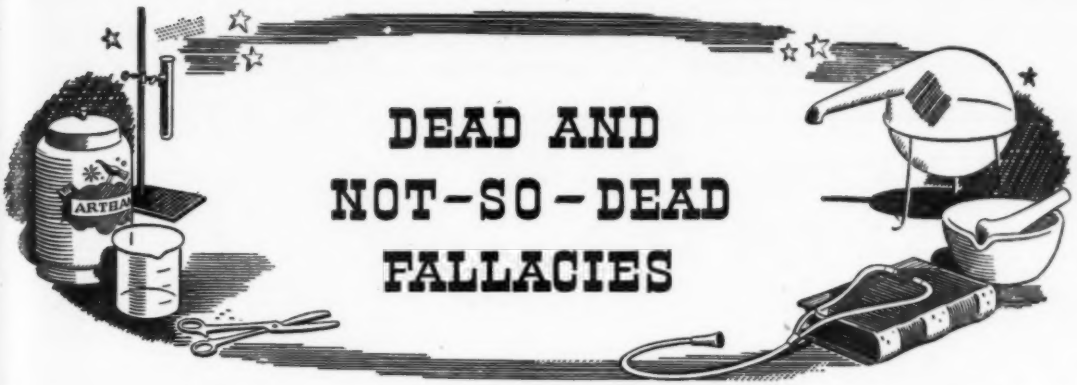

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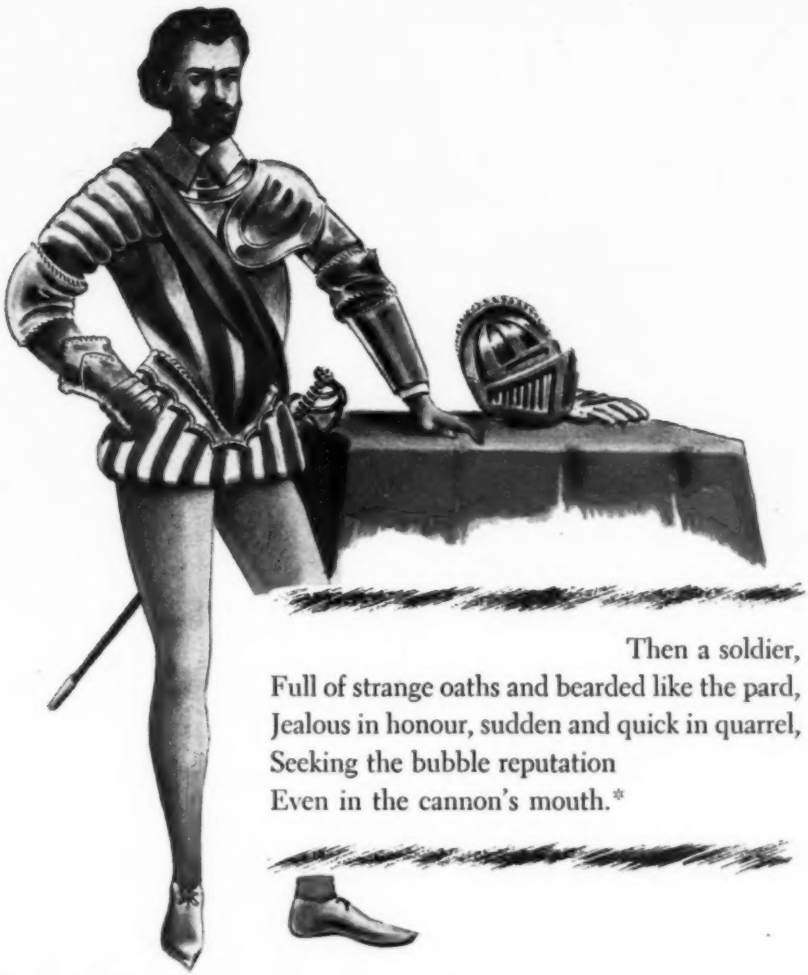

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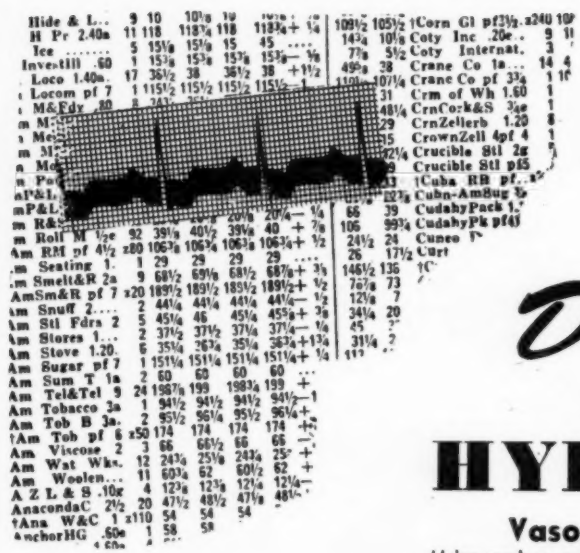

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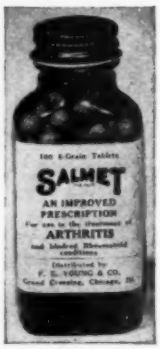

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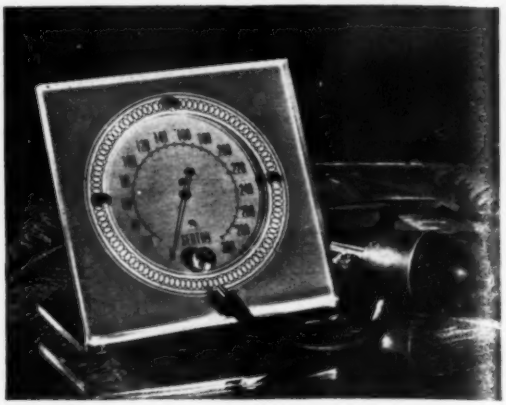

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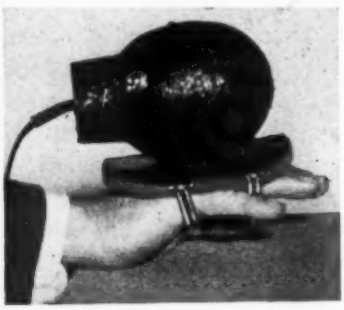

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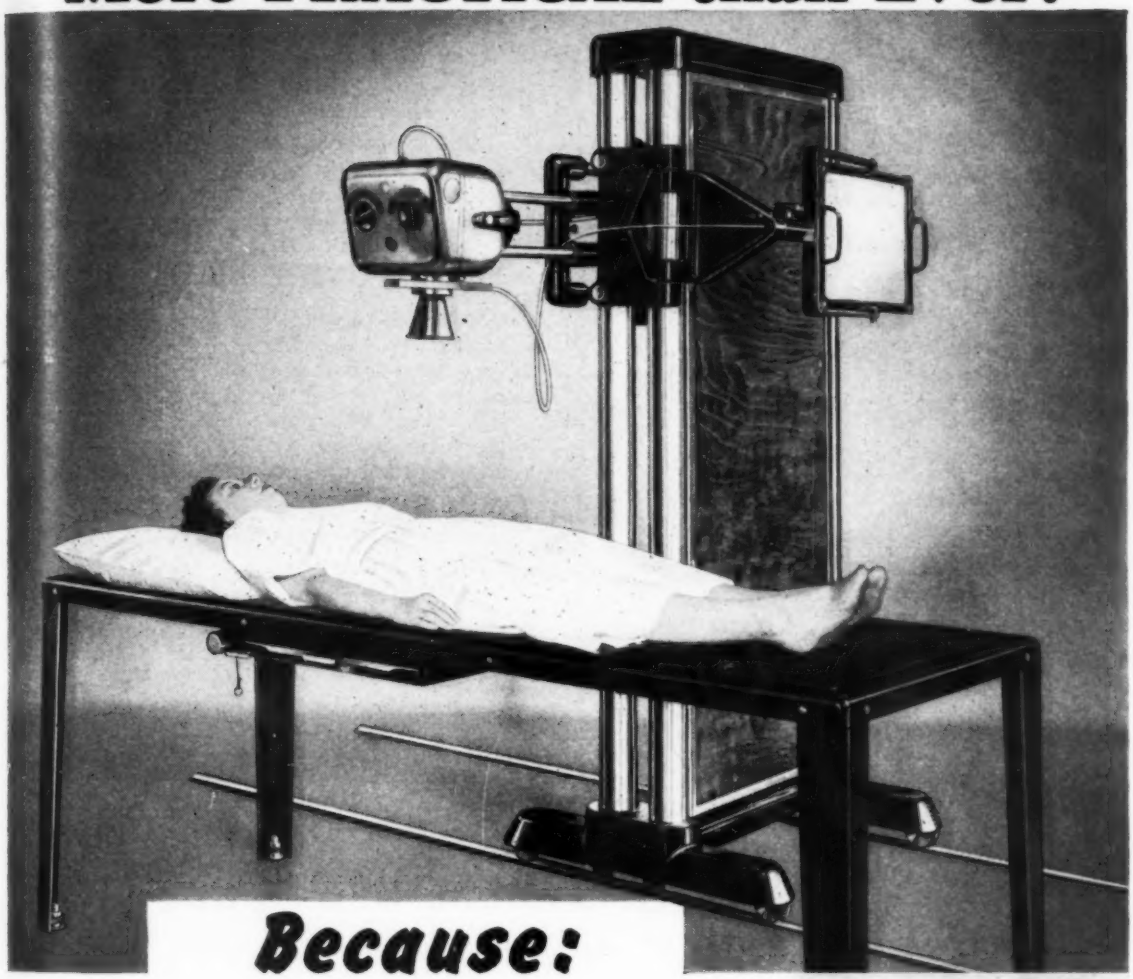

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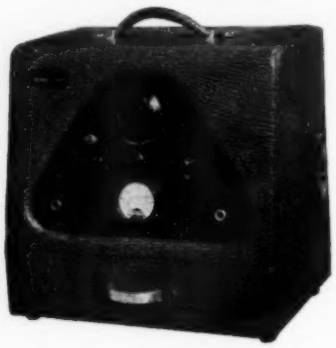

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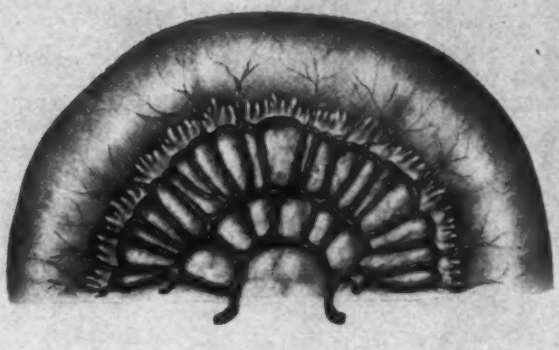

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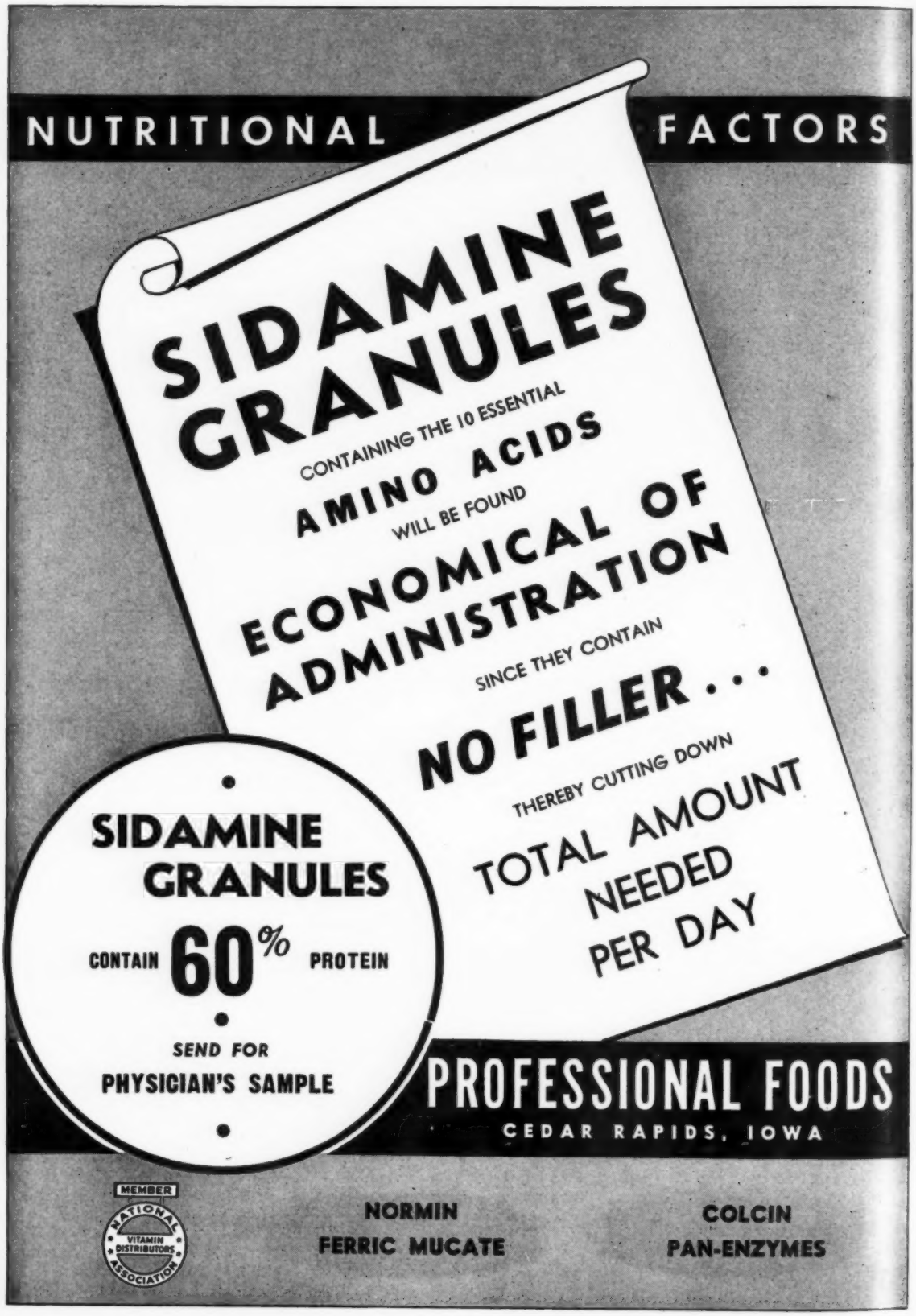
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• •

1. Gold, H.: Connecticut M. J. 9:3 (Mar.) 1945.
2. Levine, Samuel A.: Clinical Heart Disease, ed. 3, Philadelphia, W. B. Saunders Company, 1945, p. 273.
3. Gold, H.; Kwit, N. T.; Cattell, M., and Travell, J.: J.A.M.A. *119*:928 (July 18) 1942.
4. Gold, H.; Cattell, M.; Modell, W.; Kwit, N. T.; Kramer, M. L., and Zahm, W.: J. Pharmacol. & Exper. Therap. *82*:187 (Oct.) 1944.

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The Journal of the American Osteopathic Association

PUBLISHED MONTHLY BY THE AMERICAN OSTEOPATHIC ASSOCIATION

Vol. 46, No. 3 | 139 N. Clark St., Chicago 2, Ill. | November, 1946

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Sacroiliac Syndrome*

CARTER HARRISON DOWNING, D.O.

San Francisco

That the sacroiliac articulation is a diarthrosis has been established beyond reasonable doubt. Cunningham concurs in this classification but does call attention to the limiting capillary nature of the joint interval with its interconnecting fibrous bands and imperfect, rudimentary articular cavity. Morris refers to the joint as a diarthrosis, and Piersol emphasizes its real, though limited, mobility. Quain early observed the slight mobility and classified the joint with the amphiarthrodia. Sappey reaches a hyphenated conclusion in *diarthro-amphiarthrosis,* and Testut accepts this designation in that the articulation resembles an amphiarthrosis in its limited mobility and a diarthrosis in having a synovial joint cavity. These differences are discriminative rather than discrepant because the joint does partake of the nature of a half, as well as of a true, joint. Brooke, however, insists that the term diarthro-amphiarthrosis is applicable only if pathological changes have limited normal joint function. A few still stubbornly maintain that the joint is a synchrondrosis—for no conceivable reason other than to escape frank admission of its possible derangement.

The sacrum rests between the two ilia like a double keystone, which is wider in front than behind and wider above than below. Presenting the characteristics of an inverted wedge, the articulating planes of these structures are too vertically disposed to satisfy the demands of weight bearing, and this suspensory function falls upon the posterior sacroiliac ligaments which have an area of insertion greater than the surface area of the sacroiliac joints themselves. The broad, massive, wedge-shaped sacrum, the uneven interlocking articular surfaces of the sacrum and innominata and the strong ligaments which fix them give great strength and stability. Cushioned by the resiliency of the sacroiliac ligaments, we find an efficient shock absorber in what, to casual observation, appears to be a nonyielding structure.

The sacrum forms the summit of weight bearing of the posterior pelvic, or femorosacral, arch which extends from the acetabula on the sides to the sacrum that forms its middle keystone. The two extremities of this arch are firmly anchored by a counterarch (tierod) formed by the rami and bodies of the pubic bones, which proceed on a curved course until they converge in the symphysis pubis. These powerful and rigid levers have much to do with the stability or instability of their basal (sacral) joints.

The sacroiliac joint is unique in its structural and functional relations and in its marked dependency upon its ligaments. Although the muscles of the pelvic girdle do not possess a direct or discernible connection with the notable movements of the bones one upon another, these many powerful muscles are strong outside levers of control. The large size of the bones and the small size of the articulations increase antagonistic lever power. The exposed position of the joint and the many unusual angles and transitions of weight and stress, while bearing the brunt of muscular exertions, underlie its traumatic susceptibility.

The paired biaxial movements of sacral flexion and extension are the only ones clearly described in our standard texts. These movements are analogous to flexion and extension of the spine; such sacral mobility in the cadaver approximates 4 degrees. This primary movement of the sacrum occurs on a transverse axis passing through the posterior portion of the body of the second sacral segment, and is fundamentally the same in biped and quadruped. Pitkin says such a line crosses each sacroiliac joint through the interosseous (fulcrum) ligaments and lies at the approximate center of the circle that would be formed by continuing the rough arc of the upper two thirds of the auricular cartilage. One ilium cannot act independently on this sacral axis as a separate mechanism. There is immediate complementary or antagonistic action of its opposite fellow, through sacral intervention and passive resistance of pubic structures. Obviously, the innominata cannot simultaneously rotate in opposing arcs: the rigid pubic lever arms and relatively immobile symphysis prohibit any appreciable degree of divergent shift.

Bipedism necessitated the lumbar curve and through it body weight is deflected in two directions. One component of weight thrust drives the sacrum backward, tightening the anatomical base-apex wedge of the sacrum; while the other forces the forward end of the sacrum downward, resisted by the checking action of the sacrosciatic ligaments, and the tightening of the sacral wedge from below upward, and posterior to the axis of sacral flexion. This double wedge formation of the sacrum, and the manner in which sacral flexion tightens these interlocking wedges under

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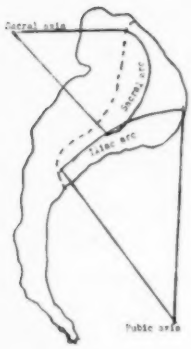

Plate 1.—Sacral and pubic axes.

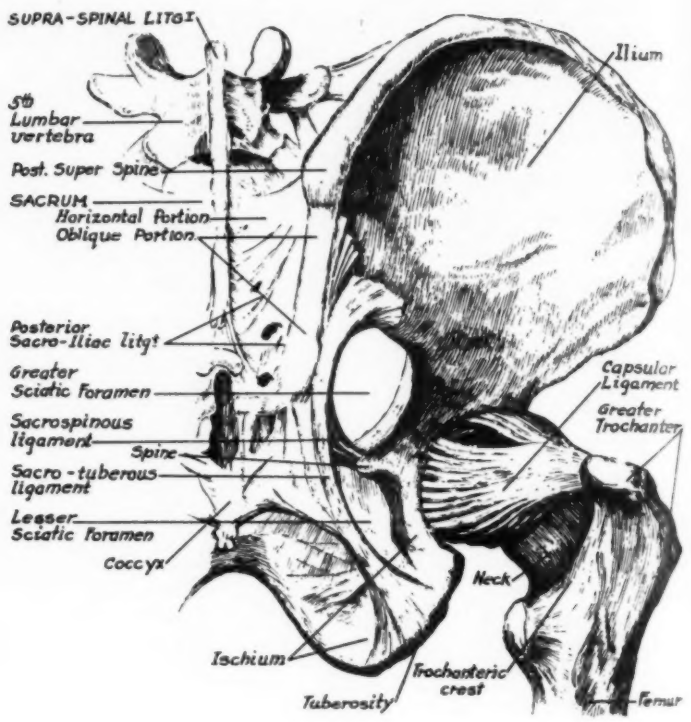

Plate 2.—Posterior view of the pelvic articulations.

weight bearing, is highly significant. This protective mechanism is lost in sacral extension, or when the pelvic girdle is relaxed as in recumbency.

All motions of the innominata about the transverse axis of the sacrum, or about the transverse axis of the hip joints, are paired motions. When the weight of the body is borne upon the lower extremities the symmetrical movements of the innominata are flexion and extension about the hip joints. The sacrum takes little part, as body weight acting through the lumbar curve holds it almost continuously in flexion lock. Pitkin claims that movements of the pelvis, other than flexion and extension about the hip joints, are associated with unpaired, antagonistic motions of the innominate bones about a transverse axis that passes through the symphysis pubis at the approximate center of a circle that would be formed by continuing the rough arc of the lower two thirds of the auricular cartilage. Since the function of the pubic arch is that of a countertie, holding the innominata in relative fixation at the symphysis, it is difficult to account for movement other than slight axial yielding to external forces. Trapped by the pubic arms of the large iliac gear, the small sacral gear must assume many eccentric or complementary positions to unpaired iliac movements.

Plate 3.—Arc of movement (rotary arthrodial) on transverse sacral axis passing through sacroiliac ligaments opposite second sacral segment.

Although the sacrum is an integral part of the spine, one cannot ascribe to it any well-defined rotary and lateral flexion movements. The contour and adaptations of the rough interlocking surfaces of the sacral joints prohibit gross movements about its longitudinal (rotational) or anteroposterior (lateral bending) axis. One notable exception exists: in the transition from quadrupedism to bipedism, the sacrum retained its horizontal axis by reason of an accommodative lumbar curve. If this curve is obliterated by flexion, the sacrum automatically becomes more vertically disposed and aligned with the lumbar spine, and a functional interlocking of segmental parts occurs. If rotation is attempted in this state a vertical axis (sacral) is introduced, allowing considerable rotational movement of the sacrum between the innominata. This movement would find its counterpart in the quadruped, which is without lumbar curve, as a vertical sacral axis would supervene if the animal attempted rotation while standing erect on its hind legs. Under the influence of this torsional stress potential mechanical lesions are multiple.

In the complex act of locomotion rotation of the pelvis en masse, around an imaginary center, is largely

by accommodation of the hip joints and lumbar spine. The fact that the lumbar and pelvic joints act as an integrated mechanism cannot be overlooked in estimating physiological interactions and effects. Reciprocal in a physiologic sense, they have great compensatory values. Furthermore, the sacrum is the key structure of diverse functions and, being suspended between the innominata, its mobilities (accommodative, complementary, or compensatory, as the case may be) take on a complex variety of kinetic adaptations. Whereas appreciable rotation and lateral flexion of the sacrum do not normally occur alone, they do accompany correlated motions that are coincidental to asymmetrical movements of the ilia. In the alternating flow of movements that characterizes locomotion, the sacrum is intricately involved in continuous antagonistic shifts of the innominata. If initial movement of one ilium in a given direction on the sacrum is carried to a point of physiologic limitation, further movement in the same plane would of necessity be sacral, acting upon the opposite innominate. This sacral movement would be in the nature of arthrodial shear, acting on the inferior anteroposterior articulating planes of the joint. Divergent iliac shifts and altered pelvic inclinations, with varying tilt and lateral deviation at the symphysis, accompany these complex movements. In discussing them I shall so far as seems practical follow the Standard Osteopathic Nomenclature. But it will be remembered that that nomenclature is rather general, and lacks the flexibility necessary for a detailed description such as this.

In flexion of the sacrum its anatomical base moves forward and downward, its anatomical apex upward and backward. The posterior sacroiliac ligaments relax and the sacrosciatic ligaments tauten. Total auricular movement of the sacrum is downward and backward and rotary on its sacral axis. If bilateral immobilization of the sacrum occurs in extreme flexion or inclination approaching the horizontal, it is termed a bilateral flexion, or what used to be known as an anterior sacral, lesion. If immobilization occurs on one side only it is a unilateral flexion lesion of the sacrum. Articular fixations established within functional limits of joint mobility do not involve an intra-articular slip or subluxation of the joint. If, however, flexion is forced and carries the sacrum beyond its extreme limit of normal movement, an articular slip or subluxation must follow. This develops as an up-posterior slip of the ilia in the upper auricular segments as opposed to further descent of the sacral base—or as an up-inferior slip of the apical sacral wedge within its iliac mortise in the lower posterior auricular segments, with interlocking or jamming of these integral parts. These sacral lesions may be bilateral or unilateral, usually the latter. As against the sacrum locked in flexion, a forcible backward rotation of the ilium on its pubic lever arm causes a posterior and decreased angle slip of the ilium, which also is classified as a flexion lesion of the sacrum. In these lesions the posterior sacroiliac ligaments are relatively relaxed, but the sacrosciatic ligaments are exceedingly tense and sensitive to palpation. If from an extreme of sacral flexion (lumbar hyperextension) forward iliac movement develops, such action of the powerful pubic lever arm upon its pubic axis forces the sacral wedge upward and forward until it is carried beyond the limits of sacral accommodation and the small eccentric sacral gear gives way: the sacral

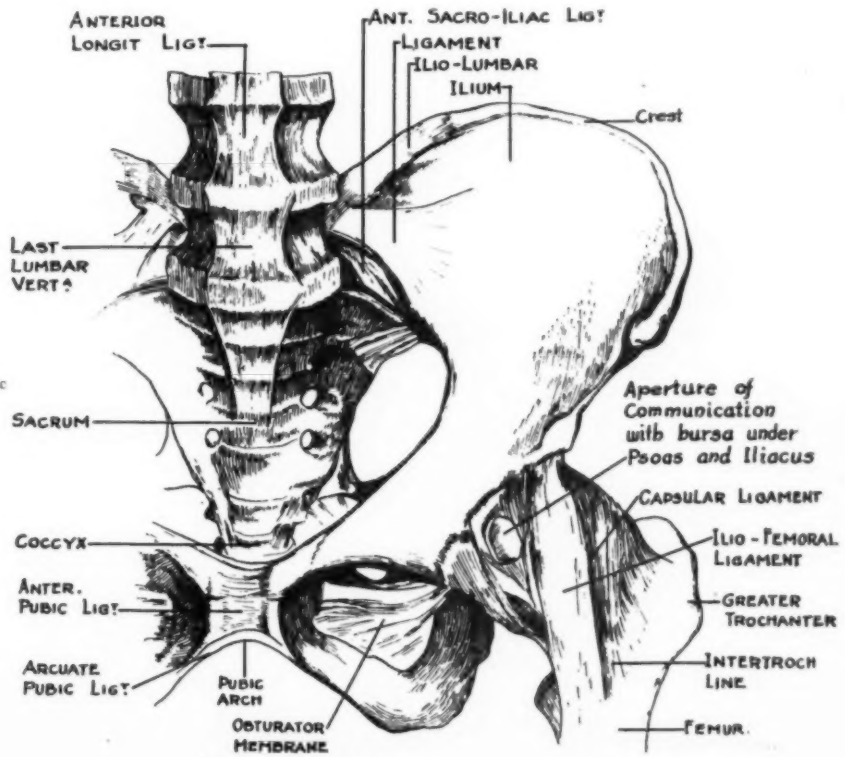

Plate 4.—Anterior view of the pelvic articulations.

base buckles up and back, permitting an anterior and forward angle slip of the ilium in the upper anterior auricular part of the joint.

In sacral extension, the base of the sacrum rotates upward and backward, which movement is resisted by the posterior sacroiliac ligaments and the inverted sacral base wedge. Immobilization of the sacrum in upward, backward tilt or inclination approaching the vertical is termed bilateral extension, formerly known as posterior, sacral lesion. If the sacrum is unilaterally immobilized in extension, it is a unilateral extension, formerly posterior, lesion of the sacrum. Providing the extreme range of normal joint mobility is not exceeded, an articular slip or subluxation within the joint does not occur. If, however, forced extension (lumbar flexion) carries the sacrum beyond definite limits of normal motion an up-posterior slip of the base of the sacrum occurs within its iliac mortise, causing interlocking or jamming of these integral parts of the upper auricular segments. These sacral lesions may be bilateral, but are commonly unilateral. If from an extreme of sacral extension anterior iliac movement develops, acting on its powerful pubic lever arm, such action propels the small sacral gear upward and forward until forced beyond the limits of sacral accommodation and the base of the sacrum buckles slightly up and back and an anterior, or increased angle, slip or subluxation of the ilium occurs in the upper auricular segments. Spreading of the iliac mortise tautens the posterior sacroiliac ligaments and they become exceedingly tense and sensitive to palpation, in contrast to the sacrosciatic ligaments which are relatively relaxed. As against a combined sacral extension and lumbar flexion lock, a forcible attempt of the ilium to rotate posteriorly on its pubic axis must result in a posterior and decreased angle slip or subluxation of the ilium. As a whole these lesions invoke a variety of iliac shifts and altered structural relations. From a study of physical estimates, classification of sacroiliac lesions may be achieved but any typing of these disorders remains in a sense theoretical because there is no precise method of metrical calculation. Possibilities for lesion are inherent in the physiologic mechanisms, and they afford interpretative aid; however, these articulations may be subject to direct or indirect trauma involving unusual torsion or shear which cause atypical effects that fail to fall into any particular category.

Each auricular surface of the sacrum is divided by a faintly discernible bony isthmus, converting each

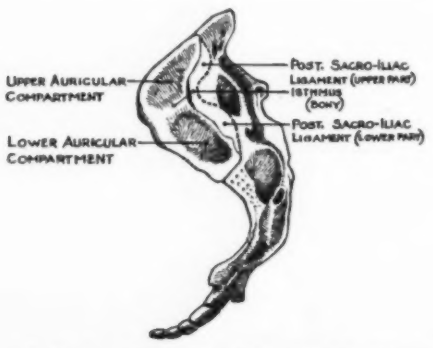

Plate 5.—Demonstrates double articular and suspensory mechanism of sacrum.

sacroiliac articulation, in a restricted sense, into an extremely shallow, double ball and socket joint. This does not inhibit full arthrodial movement of the joint. The deep fibers of the sacroiliac ligaments supply each segment in such rudimentary arrangements that it appears the joint possesses not only a double auricular but also a double suspension (fulcrum) mechanism. There is a notable paucity of fibers supplying the intermediate portion of the joint, comprising the isthmus. Sacroiliac maladjustments do not necessarily involve the entire joint; partial articular slips occur in which only one auricular segment is grossly concerned. Accordingly, it is theoretically possible to classify intra-articular lesion as: (1) complete auricular, (2) upper auricular, and (3) lower auricular. Alternating compression and decompression of joint articulations, or changing ligamentous tension and stress with shifting pivotal or fulcrum effects, undoubtedly influence atypical sacral mobilities. Unpaired iliac movements upon the multiple-contoured auricular surfaces of the sacrum involve an intricate integration and interplay of concentric and complementary eccentric positions as coordinated between the two auricular segments. The inferior anteroposterior (iliac) plane of the sacroiliac joint merges anteriorly at any approximate right angle with the anterior vertical (sacral) plane often forming an intermediating facet upon which both sacral and iliac axes operate. The effects of altered sacral mobilities are often contradictory. Immobilization of one sacroiliac joint may divert functional responsibility to the opposite joint. Treatment based purely on symptomatic aspects is a serious error for, in many instances, the joint of compensating motion stress presents painful symptoms, while the symptom-free joint is the offender demanding restoration of normal mobility. Reflected throughout one entire half of the body, abnormal physiologic continuities of static or dynamic stress may give rise to that common syndrome called *right sideitis*.

The lumbosacral joints are concurrently implicated in sacroiliac disorders. As the key to evolving bipedism, they present the most striking example of our late and immature transition to the orthograde position. Orthostatic and dynamic strains within the postural complex bear heavily upon these parts chronic malseating of sacral joints is inevitable. Multiple postural traumas affect a *locus minoris resistentiae* and a conditional susceptibility to secondary injury and to abnormal metabolic states. Prolonged mechanical irritation invites early osteoarthritis. The upper sacral articulations are the major compensatory and accommodative mechanisms for postural failures arising from developmental or organic variations effecting an actual difference in bilateral symmetry of the integral halves of the underlying pelvis and its supporting structures. Such basal faults with their concomitant lateral and torsional stress upon spine and pelvis are the outstanding mechanical cause of scoliosis. As a group they constitute the most common source of recurrent sacroiliac and chronic lumbosacral strains. Postural faults involving anteroposterior equilibrium have received great consideration as a cause of lower back disabilities and pain, while disorders of lateral equilibrium have received scant notice even though torsion is the most damaging of all stresses.

The causes of sacroiliac disease may be grouped broadly as traumatic and nontraumatic. Under these headings general classifications are suggested:

(A) Traumatic
  (1) direct
    (a) subluxations, dislocations, fractures, strains, sprains
    (b) postural, i. e., orthograde disorders
    (c) occupational
    (d) obstetrical
  (2) indirect
    (a) developmental or congenital anomalies of bone or joint
    (b) constitutional affections and diseases, metabolic disorders, senescense with organic alterations of bone and joint
    (c) postsurgical complications

(B) Nontraumatic
  (1) specific infections and nonspecific infectious arthrites
  (2) toxic, endocrine, metabolic states—noninfectious arthrites
  (3) rheumatic myositic and fibrositic syndromes
  (4) reflex idiopathic
  (5) neurological
  (6) neoplastic

The ligaments around the sacroiliac joint are severally named, according to anatomical relations. The posterior sacroiliac ligament is exceptionally strong and is the chief bond of union between sacrum and ilium. It consists of three sets of fibers—superficial, deep horizontal and oblique. The deepest fibers constitute the so-called interosseous ligament. The deep ligaments bear the brunt of weight bearing and are the principal check on sacral mobility. Weakening allows the sacrum to sink more deeply into the iliac mortise with added compression of joint planes. Coupled with lordosis, this lesion is common in obese persons, especially women. The overstressed joints are markedly irritable and sensitive to palpation.

The sacrotuberous and long posterior sacroiliac ligaments are formed in part by vestigial continuations of the tendinous origin of the semitendinosus and the long head of the biceps femoris muscles. The common aponeurotic tendons of the sacrospinalis and gluteus maximus muscles also blend with the posterior sacroiliac and sacrotuberous ligaments. Therefore it is readily understandable why referred pain in the lateral crural regions is found constantly with ligamentous strains of the sacroiliac joints. Violent traction of the biceps femoris and the semitendinosus and semimembranosus on the ischial tuberosity can cause a posterior iliac slip, and altered iliac inclination incites painful tensions in the quadriceps. Excessive pull of the quadriceps femoris upon its pelvic attachments can produce an anterior iliac slip and ischial traction reflected through the hamstrings may carry well into the dorsum of the knee. Following sacroiliac disorders, sitting on a malaligned ischial tuberosity with its deep involvement of muscle and nerve can be a very painful ordeal. The common perineal nerve lies in close relation to the biceps femoris, and the sciatic nerve runs between it and the adductor magnus. The sciatic nerve may be irritated as it passes through the groove formed by the outer and inner hamstring muscles when these muscles are tense or spastic. Affection of the sartorius muscle with its oblique attachments and pull is only one of the complex functional malalignments possible in iliac-genicular derangements so commonly coupled with sacroiliac disorder. Fixed iliac abnormalities disturb correct muscle mechanics and correspondingly influence genicular functions. In athletic injuries the so-called pulled muscles, or tendon injuries, are often attributable in part to restricted iliac mobility. Conversely the lowly flat foot can, by its mechanical defect, implicate the sacroiliac joints.

The gluteus maximus, attaching along the alar crest of the ilium and fusing with the lumbodorsal fascias, is also intimately connected with the tensor fascia lata which, in turn, merges with the iliotibial band. The sciatic nerve runs between this muscle and the quadratus femoris. Musculofascial tensions may give rise to painful symptoms and palpable tenderness in the posterolateral aspect of the lumbosacral region, buttocks, thigh and knee. Abnormal contracture of the fascia lata or iliotibial band may be demonstrated by Ober's test: from a side position the thigh is abducted widely and then hyperextended; from this point it is allowed to drop or adduct toward the table; if contraction is present, this movement is limited. The superior gluteal nerve, passing over the piriformis and between the gluteus medius and minimus which it supplies, is often involved. The peroneal portion of the sciatic nerve passes between the two bellies of the piriformis muscle as does the inferior gluteal. The main sciatic nerve, popliteal division, passes between the piriformis and the superior gemellus into the thigh. Abnormal contractions of the piriformis may involve the sciatic nerve although it would appear, in normal contraction, that this muscle bridges and protects the nerve. The lesser sciatic nerve courses between the gemelli into the pelvis giving rise to the long pudendal nerve. The sciatic and the posterior cutaneous (lesser sciatic) nerves pass in close proximity to the obturator externus and quadratus femoris muscles and these nerves, together with the obturator, are often involved in lesions of the sacral joints.

The psoas major takes origin from insertions of all lumbar vertebrae and passes downward across the brim of the lesser pelvis and in front of the capsule of the hip joint; merging with tendon fibers of the iliacus it inserts into the lesser trochanter of the femur. The lumbar plexus passes through the psoas and on its medial side this muscle is closely associated with the gangliated trunk of the sympathetic. The iliacus, in turn, is in close proximity to the femoral nerve. The immediate relation of the iliopsoas muscle

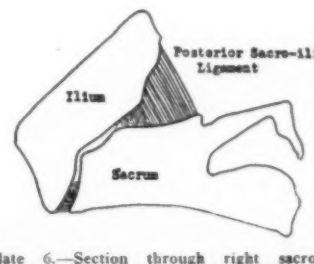

Plate 6.—Section through right sacroiliac joint demonstrates wedge mechanism of second sacral segments and suspension action of posterior sacroiliac ligaments.

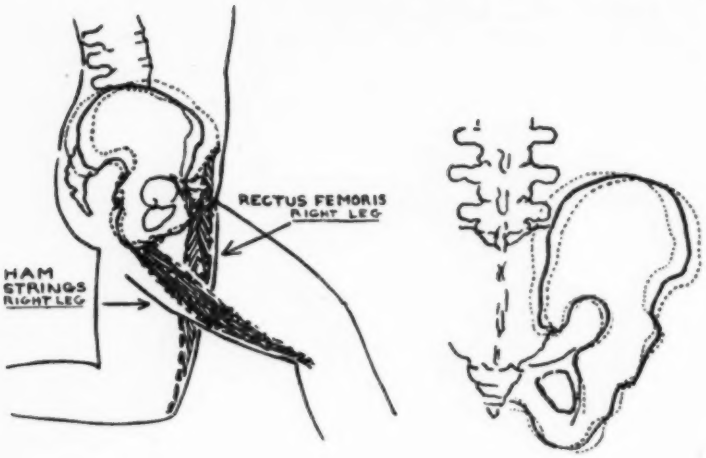

Plate 7.—Left, shows side view of the effects of rotation at the sacroiliac joint in two directions—ilium carried either forward or backward. Illustrates the leverage action of the rectus femoris and hamstrings on the innominate. Right, shows posterior view of the effects of rotation at the sacroiliac joint and general change in contour of the innominates (Ashmore).

to the sacroiliac joint in front renders it susceptible to any traumatic incident or infection involving this articulation: in turn psoas fibrositis places abnormal strain on sacral joints.

The sacrospinalis serves as an extensor of the lumbar spine although, when acting on one side only, it produces lateral inclination assisted by the iliocostalis and quadratus lumborum. These powerful levers can account for sacroiliac strain through apparently trivial cause, such as a hard cough or sneeze. The anterior sacroiliac and lumbosacral ligaments fuse with the tendinous origins of the iliacus (muscle) from the transverse processes of the last lumbar and upper sacral segments. They are analogous to the intertransverse ligaments and tendinous origins of the psoas and quadratus lumborum from the transverse processes of the lumbar vertebrae. The iliolumbar ligaments give partial origin to the sacrospinalis and multifidus muscles. A knowledge of these phylogenetic relations affords a better understanding of the scleratomal pathways of referred pain.

The sacroiliac joint is innervated from anterior divisions of the second, third, fourth and fifth lumbar and first sacral nerves, by way of direct branches from the lumbosacral cord, the superior gluteal and obturator nerves. The joint receives filaments from posterior primary divisions of the first and second sacral nerves and from the pelvic portion of the sympathetic gangliated cord. The lumbosacral joint is supplied by direct branches of the fourth and fifth lumbar nerves and the lumbar portion of the sympathetic gangliated cord. The posterior sacroiliac and sacrosciatic ligaments receive direct branches from the posterior sacral plexus, which lies deeply embedded in the substance of the posterior sacroiliac and sacrosciatic ligaments. This plexus is composed of branches from the posterior divisions of the last two lumbar and first three sacral nerves. These ligaments receive filaments from the origins of the sacrospinalis, multifidus, gluteus maximus, piriformis, biceps femoris and semitendinosus muscles; also from a branch of the anterior division of the fourth sacral nerve.

From anatomical findings and the application of Head's rule, Pitkin concludes that pain may be referred from the sacrolumbar articulation to the fourth and fifth lumbar posterior dermatomes; from the sacroiliac articulation to the fifth lumbar and first and second sacral posterior dermatomes; from the iliolumbar ligament to all five lumbar and the first three sacral posterior dermatomes, as well as the first three lumbar anterior dermatomes; from the sacrolumbar and anterior sacroiliac ligaments to the second and third lumbar anterior dermatomes; from the posterior sacroiliac and sacroischial ligaments to all of the five lumbar and the first three sacral posterior dermatomes, as well as to fifth lumbar and the first three (or four) sacral anterior dermatomes. Smith-Petersen and others find that pain from the sacrolumbar joint should be referred largely to the last two lumbar dermatomes, but that pain from the sacroiliac joint should be referred to the last two lumbar and the first two sacral dermatomes, with possible neuralgic radiation along the course of the superior gluteal and obturator nerves.

The lumbar plexus takes origin from the twelfth dorsal to the fourth lumbar segments inclusive. From above downward in major order of neuromerous derivation this plexus gives rise to the iliohypogastric, ilioinguinal, genitofemoral, lateral cutaneous, femoral and obturator nerves. The sacral plexus takes origin from the fourth lumbar to the third sacral segments inclusive. It forms the great sciatic nerve. From above downward in major order of neuromerous derivation this plexus gives rise to the superior gluteal, nerve to quadratus femoris, inferior gluteal, nerve to obturator internus, nerve to piriformis, posterior femoral cutaneous, and the peroneal and tibial nerves.

Pitkin observes that the typical syndrome of pain which accompanies lesions of the sacroiliac and sacrolumbar joints and their accessory ligaments may be referred to the gluteal or sacral areas, or both, and may affect any or all parts of the lower extremities and genitoinguinal regions excepting the internal crural and plantar zones by way of the saphenous nerve. Although none of the four groups of nerves supplying the gluteal region derives from the sciatic trunk, he claims this is the region most frequently affected by sacrarthrogenetic (sic) telalgia. The posterior femoral, the lateral femoral, the sacral, the inguinal, and the genital regions are not included in the distribution of the sciatic nerve but are commonly affected. The posterior femoral cutaneous (small sciatic) nerve supplies the inferior gluteal region, the posterior femoral region, and portions of the scrotum, but does not cover several of the areas to which telalgia is commonly referred. If telalgic pain regularly involves areas beyond the boundaries of the sciatic distribution

consistently shuns certain sciatic territory, and is difficult to localize, Pitkin insists that the terms *sciatica* and *sacrarthrogenetic telalgia* are not synonymous and should be divorced. He claims that such telalgic zones are supplied by peripheral nerves deriving from both the anterior and posterior divisions of every spinal nerve from the first lumbar to the third sacral segment. However, they regularly fail to involve the fourth lumbar anterior dermatome and only rarely involve the second and third. The motor and sensory changes usually associated with compression of nerves are conspicuously absent in telalgia. Where atrophy is present the electrical reactions are normal, indicating that nerve changes belong to the functional groups of reflex physiopathic disturbances and phenomena of disuse; that they are not the result of compression or irritation of deep and peripheral nerves.

In uncomplicated intra-articular lesions of the upper sacral joints, pain localizes over the joint or in the intergluteal area. The greater the involvement of the extra-articular ligaments, the wider is the dissemination of referred pain. Although telalgic pain in the posterior dermatomes of the sacral region may persist after radiation to the anterior dermatomes in the lower extremities has ceased, in sacroiliac sciatica, local relief of joint symptoms often precedes nerve recovery.

While mechanical causes far exceed any other, sciatica is a symptom of many and varied disorders as widely separated as pelvic or spinal tumors, prostatitis, rectal abscess, focal infections and toxic neuritis, vascular diseases — such as arteriosclerosis or thrombo-angiitis — metabolic diseases and dyscrasias such as gout, diabetes or pernicious anemia. It may include a host of arthropathies ranging from lumbarthritis or spondylitis to a congenital anomaly or a malignancy. One cannot exclude fascitis and myofascial syndromes or deep traumatic injury of the nerve. A history of long-continued overexertion, exposure or occupational strain is quite common. A radiculitis (perineuritis) may be due to rigorous factors, yet it may have a rheumatic, luetic or tuberculous background. Sciatica is a symptom usually without nerve involvement although a diminished or lost achilles reflex with anesthesia may suggest nerve disease or injury.

In the sciatic notch the nerve passes close to the inferior border of the sacroiliac joint and an articular slip, abnormal piriformis contracture or excessive stress upon the deep portion of the fascia lata may produce some narrowing of the sciatic aperture with pressure effects. Since the nerve is accompanied by its own blood vessels, pressure may cause hyperemia or ischemia of the nerve. As the lumbosacral cord passes over the brim of the pelvis it lies in immediate contact with the anterior sacroiliac ligaments. Abnormal states of joint or ligament are possible pressure irritants. Occasionally a severe sciatica follows on the heels of sharp stooping or lifting. Violent shooting pains come simultaneously with marked muscle spasm and rigidity of the lower back. Such traumatic lumbago may induce a spastic "set" of the sacral and lumbar joints, immediate disruption of which affords remarkable relief.

Avulsion of the intervertebral disc or dissipation of disc substance into the root canal may cause an intractible sciatica with sharp, intermittent attacks of pain which are aggravated by coughing, sneezing or jarring blows. Concentration of the total protein in the cerebrospinal fluid may be increased and herniation of the disc may be visualized in a roentgenogram following injection of radiopaque oil into the spinal subarachnoid space. Hyperflexion at the lumbosacral angle may give symptomatic relief as the posterior buckling of vertebral parts reduces the relative degree of posterior displacement of the disc. Contrariwise, hyperextension increases lumbosacral angulation, crowds in and upon the disc and aggravates its relative posterior displacement. Uncomplicated disc displacements may be reduced by manual procedure. The patient is positioned on the side with the lumbar spine locked in hyperflexion and the sacrum in forced extension. Flexion angulations (determined from below upward) must be accurately gaged to the desired break point. Counter stabilization of the spine from above downward to the point of lesion is obtained by an extension-rotation lock. Once lever controls are established, a sharp angle thrust directed upward against the apex of the sacrum causes acute buckling and posterior segmental shear at the focal point. The disc is trapped and in the force of physiologic recoil it locks in normal position.

Whereas sacroiliac strain causes great pain and disability in adults, it rarely assumes acute proportions in children: rather, it is evidenced in dull backache or leg ache and the symptoms vaguely dismissed as "growing pains." Since sciatica consistently accompanies sacroiliac disorders, possible involvement of this joint must be suspected in every instance where sciatica is the chief symptom presented until it can be ruled out by examination. Dull and persistent, or intermittent, attacks of lower back pain with varying disability may be the chief symptom of chronic or recurrent strains. Palpable tenderness with evidence of pathological alteration of the posterior sacroiliac ligaments are the most direct and constant signs, and the least confusing evidence, of joint disorder. Deep pressure just above the sciatic notch elicits local and often referred pains that are highly suggestive. Palpable tenderness may be found all along the iliac crests, and over the anterior superior spine and symphysis pubis. Tenderness may be referred into the deep fasciae along the marginal lines of the groin and

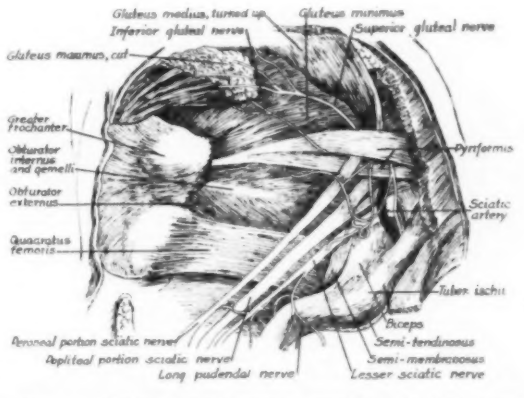

Plate 8.—Relation of sciatic nerve to muscles of the thigh. Peroneal portion of sciatic nerve passes between the two bellies of the piriformis muscle (Adapted from Morris).

abdomen. Baer's abdominal sacroiliac point closely approximates McBurney's point and it is easy to realize why referred pains and musculofascial stresses in these zones can incite symptoms not unlike those of appendicitis or ovarian-tubal disease. Widespread neuralgic radiation and tenderness may extend well into the lumbar, sacral, gluteal and crural regions.

In sacroiliac disorders, inability to flex or extend the lower back fully or to turn easily and painlessly when recumbent is characteristic. Joint pain may be aggravated by recumbency; may be accentuated by climbing stairs or by rising from bed after extended inactivity. Irritable muscles tend to intensify spastic "sets," particularly when mechanical disorders are complicated by osteoarthritis. Pains may be fleeting and inconstant. A sense of fatigue, weakness, or insecurity may develop in the affected limb. Stance, posture and gait are patterned to spare the lesioned parts. Body weight tends to list away from the afflicted side and locomotion is guarded. Pitkin says that *sacrarthrogenetic* telalgia is regularly accompanied by scoliosis and that its pattern clearly differentiates sacroiliac slips from sacroiliac strains or arthritis and, in three cases out of four, affords a positive differential diagnosis between sacroiliac and sacrolumbar disturbances.

Because of its greatly restricted mobility we have ignored the full possibilities of functional investigation of the sacroiliac joint as contrasted with joints of free motion. This joint is not subject to immediate muscular recoil, and this lack of rapid response to contractile forces allows it to maintain its position long enough for satisfactory examination; under passive conditions following iliac leverage it remains at a point of natural inertia, or rest, at either of the two normal extremes of movement. Accurately conducted, this test offers concrete evidence of articular mobilities and, when they are abnormal, indicates the point of fixation. Since these antagonistic leverages create a greatly magnified and diverse arc of acetabular movement, observations made from shifting malleolar levels are best for analytical deductions: with the patient supine, two distinct types of leg leverage are employed; to rotate the ilium anteriorly to a normal extreme of position, the leg is drawn across the midline with the hip and knee in easy flexion to neutralize partially the flexors and extensors of the thigh and pelvis. Adduction establishes a powerful traction on the thigh and ilium. From this point, sharp external rotation is conducted through the long axis of the femur, the acute revolving, or windlass, action of which imposes a strong forward and downward pull of the iliofemoral ligament upon the ilium, implemented by tensile effects of the abductors, extensors, and rotators of the thigh. Rotation on this arc has the effect of apparently lengthening the lower extremity with slight inversion. To obtain the maximum range of posterior rotation of the ilium the slightly flexed leg and thigh are abducted to a point of tension limitation. From this point, with abduction maintained, sharp internal rotation is employed; this acute windlass motion, acting on the long axis of the femur, rotates the ilium backward. Traction upon the posterior fibers of the capsular ligament, particularly the ischiocapsular fibers, is augmented by the combined tensile pull of adductors and rotators of the thigh. In conducting this test the ankle and foot must be grasped firmly to immobilize both members and prevent lost motion and ineffectual leverage. Rotation in the posterior arc of iliac movement has the effect of producing an apparent shortening of the limb with slight eversion of the foot and external rotation of the thigh. The routine method is to test for total range of disparity of iliac movements in two directions, first by comparing the effects of lengthening leverage of one leg with the shortening effects of the other, and then reversing the procedure. Normal, unimpaired iliac movements in alternate directions must be equal and sufficient as shown in diverse shifts of the internal malleoli.

A bilateral motion shift of less than ½ inch indicates a bilateral restriction of sacroiliac mobility. A bilateral motion shift of considerably greater than 1 inch indicates hypermobility. However, age and individual factors must be considered in estimates of relative mobility. A difference in the respective totals of unpaired iliac mobility as shown at the malleoli indicates partial fixation in the direction of the lesser of the two. In unilateral posterior iliac fixations, if lengthening leverages are applied to both innominates, the leg on the immobilized side refuses to lengthen, but the malleoli assume the same levels when shortening leverages are bilaterally employed. Conversely, in unilateral anterior iliac fixations the leg on the immobilized side fails to shorten; but when lengthening leverages are bilaterally employed the malleoli assume the same level. If pelvic asymmetry is unchanged by application of these leverages it indicates unpaired bilateral iliac fixation. Excessive mobility to both shortening and lengthening leverages on one side as contrasted to mobilities of the other may signify unilateral hypermobility. Following treatment, these tests may be used to learn whether or not proper joint

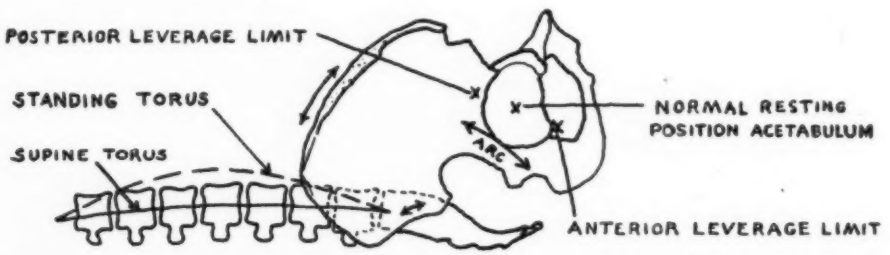

Plate 9.—Scheme represents changes in the relative position assumed by the acetabulum to the functional test. A backward rotation of the ilium foreshortens the acetabular position in relation to the long axis of the leg and trunk. A forward rotation of the ilium forelengthens the acetabular position in relation to the long axis of the leg and trunk.

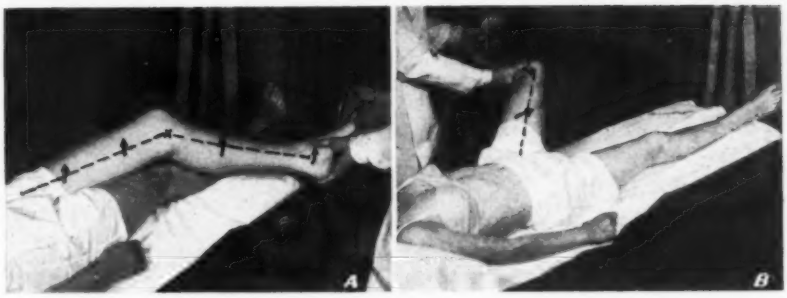

Plate 10.(A) indicates position of leg and thigh in relation to torso to produce lengthening of the limb through forward rotation of the ilium. (B) indicates position of leg and thigh in relation to torso to produce shortening of the limb through backward rotation of the ilium.

reduction has been effected and equalized iliac mobility restored.

X-ray findings are generally disappointing in sacroiliac disorders. It is impossible to make accurate deductions of minute and complex structural shifts because the x-ray lacks necessary isometric qualifications. Final analysis of these physiologic disorders rests on clinical examination. This is merely an uncritical recognition of x-ray's limitation for certain diagnostic purposes and is not to deny its necessary place in routine examination.

Inasmuch as any one of a number of muscle incoordinations may cause the innominata to assume imbalanced positions without transgressing the laws of normality, we may get lost entirely in a maze of physiologic disequilibriums by placing undue emphasis upon such factors. They neither affirm nor deny an articular disorder. Apparently the same muscle-induced pelvic asymmetries may be noted in either lumbar or sacral joint strains or in abnormal muscle states. Therefore, accurate methods of clinical differentiation are necessary.

Lesion points in the upper sacral joints may be localized by lateral rocking tests of the knees, with the patient supine and the thighs and knees passively flexed. These movements must be properly gaged with one hand as the examining hand under the patient notes their effects. Controlled test movements of articulating parts will usually elicit pain if there is joint involvement and they are indispensable in determining the specific nature of joint dysfunction. Lateral movement is restricted when the approximated feet, swung from side to side, are carried away from the side of contractions. Lumbago may simulate sacroiliac disorder but palpable tenderness is usually well localized in the lumbar muscles and not over the sacroiliac joints. Fibrositis may aggravate joint symptoms by its widespread involvement of fascia, aponeurosis, tendon, and ligament. As in osteoarthritis, senescence is characterized by unusual joint stiffness which may complicate mechanical disorder and accentuate both disability and pain. Spina bifida rarely produces notable symptoms, nor do complete sacralizations give rise to the troublesome symptoms that attend the partial type. Although spondylolisthesis may be the direct result of trauma, luxation or fracture (pedicles), it is often a congenital defect in which anomalous facets permit an abnormal slip of the vertebrae.

In testing for Lasègue's sign, with the patient supine, the lower limb is flexed on the body with the knee extended. Early and painful limitation of movement suggests sciatica or contractures of the gluteal and hamstring muscles; it can indicate an extension lesion of the sacrum, if that bone is locked against anterior rotation upon the ilium. Pain, on increased

Plate 11.—In test movement 1 (moderate elevation) pain may be elicited if there is hip joint disease. Considerable elevation, causing hamstring tension, tends to cause pain if the sacroiliac joint is implicated. If the ilium is fixed, as in test movement 2, it partially prohibits sacroiliac motion, and if pain lessens suggest diagnois of sacroiliac strain. In test movement 3, dorsiflexion of the foot exaggerates tension on the sciatic nerve but produces no increase of strain on the sacroiliac joint. A pain response suggests sciatic irritation (Adapted from Mennell).

extension of this movement, implicates the lumbar spine.

For Goldthwait's sign, with the patient supine, straight leg lifting is attempted with the knee fully extended and the foot dorsiflexed: with the examining hand placed under the lower lumbar region, the operating hand raises the leg. Pain immediately preceding that in the lumbar spine tends to confine it to the sacroiliac joint or its ligaments. Pain occurring only after motion has invaded the lumbar spine places its probable cause in that region. However, in anterior sacral slips the value of this test is doubtful as the joint lock and the leverage effects of the test coincide.

For Gaenslen's sign, with the patient supine, one leg is hyperextended over the edge of the table while the opposite knee and hip are acutely flexed upon the abdomen, to lock the lumbar and sacral joints. In anterior iliac slips the test is essentially negative for obvious reasons. In Ely's sacroiliac test, with the patient prone, the knee is flexed and the leg hyperextended at the thigh. Although it may be employed to test iliac mobility, its value is essentially limited to hip-joint disease, or where spastic muscles or fascial irritants have set up chronic flexion contractures in the hip or thigh. None of these tests is impressive, although generally they are helpful.

An analysis of lumbar and sacral lesions involves consideration of all component elements of the joint: osseous, periosseous, cartilaginous and intravertebral disc structures, and deep connective, fascial and muscular tissues. Proper discrimination is important to successful interpretation of any and all findings. It is possible to have a broad appreciation of the ill effects of lumbar and sacral disorders beyond the circumscribed limits of local pathology and the internist may well view their consequences in the light of internal medicine.

In strains or sprains it is assumed that ligaments are primarily involved not necessarily to the point of rupture, but rather to the extent of molecular breakdown and reduced elastic content. In such instances the joint may become frankly hypermobile, or may hold as a matter of choice a structural deviation and semiworking condition within the restricted zone. Again the joint may enter into deep protective articular or spastic "set." After injury joints may recover only partially from maladjustment and strain, and thereby set up a secondary chain of pathological iniquities.

Plate 12.—Illustrates general position of patient and operator for reduction of sacroiliac and lumbar subluxations.

Periosseous injuries may open the way to more serious consequences, particularly traumatic arthritis. In the lower back, gross malformations of curve or acute segmental axial faults invite early deterioration of intervertebral discs. Exacted from the phenomenon of orthograde existence, alterations of conventional form of the discs are common; in fact, one gains the impression that after middle life well-preserved discs are the exception rather than the rule. The history of discs is one first of high elasticity and fluid content and later dessication through loss of both. Axial stress (compression) is shifted to the posterior vertebral columns and facets, and this is accompanied by osteoarthritic lippings and spurs on vertebral bodies. Gross injuries to discs are not infrequent, although scarcely as common as popular surgical trends would have them. They are not the answer to every unsolved disorder of the lower back, but altered discs are a pertinent and troublesome factor in chronic and recurrent lesions.

In lumbar and sacral joint lesions, soft tissue technic should not be pushed into a primary role without regard first for the release of deep structural derangements and articular immobilities. Unless there is a focal release of "pent up" segmental motion the attendant muscles and connectives cannot resume their normal placement and working conditions. Long and strenuous manipulation of soft tissue merely adds physiological insult to already aggravated soft tissue. Even in primary, or major, soft tissue lesions if they be complicated by deep spastic or articular joint lock, articular mobilities should first be brought into immediate play.

Intra-articular fixations may or may not be complicated by subluxations. It is simply a question of whether the joint is locked slightly within or slightly beyond the extreme of normal range of motion. Only when pathologically limited do these functional types of articular restriction occur in midrange of movement. The technics of reducing arthrodial slips or "facet" syndromes must be sharp, precise, smooth and nontraumatizing: they are corrective thrusts of exceedingly short amplitude. The range of any one joint is very limited and, once regional lockings, leverage and slack have been taken up, the residue of movement for corrective thrust is sharply confined. "Trigger" speed minimizes force and catches the articulation unprepared. Quick "get-away" is essential to avoid tissue recoil and the instinctive reaction of the patient. Specific *bony technic* properly performed within the muscle guard is neither painful nor a physical insult to the joint. Accurate measures of regional spinal lockings and leverage are mandatory. Physiological, or "facet" locking is not a composite and synergistic movement of side-bending rotation: it is not physiologic movement, as ordinarily conceived, but it is an attempt to penetrate and neutralize the muscle guards and lock the facet mechanisms functionally in a movement of side-bending and antagonistic (reversed) rotation—a functional attempt to duplicate the movement which would find its organic counterpart in scoliosis. Ordinary passive movements cannot overcome the resistance of a highly static joint. Reduction of deep intra-articular joint lock merely by putting joints through their ordinary paces may be physiologically tenable and good theory but, clinically, it is just bad practice. Carried to an extreme, passive movements of synergistic side-bending rotation offer tension

strain of parts and, forced beyond safe limits, can result disastrously. For example: to side-bend the cervical spine in one direction, hold the position and attempt to rotate the spine in the opposite direction causes "facet" locking. It may be compared with typical physiologic side-bending and rotation in the same direction, in which instance the limiting factors are tensile only. On completion of physiologic "facet" lockings transition to leverage is immediate and automatic and, if it is properly offset by counterlocks, leverage, or anchorage, a focal break of levers develops at the point of lesion. These preliminary positional and regional locks should always be established outside a point of forced strain. These measures not only prepare the way for effective leverage but also set up protective guards to the immediate articulating parts not involved.

Flexion is an anatomical lock. Lumbar flexion lock is determined from below upward and can be focalized to any desired break point in the lumbar column. For the sacral joints, sharp angle flexures are a necessary positioning procedure. Counterstabilization is obtained by extension side-bending rotation of the spine above. This partakes of the nature of combined physiologic and anatomical locks. All strong corrective thrusts should be delivered through the lower lever, never the upper—which latter is maintained only for the purpose of counterpositioning, stabilization and anchorage. The action of these two levers, properly controlled at the exact point of lesion, places the articulation under all the specific mechanical stresses required for reduction. Beyond this point angle thrusts are so given as to effect a corrective shear in line with the arthrodial planes of the joint involved. These tactical principles have multiple applications and adaptations in the sacral and lumbar joints and can best be executed with the patient laterally disposed on the operating table. Corrective thrusts can be given as direct or crossed shears; in the latter case their force is transmitted through to the side opposite the one to which the thrust is given. The result of angle thrusts, in many instances, is the indirect product of resultant forces set up. Many methods can be and are used: experience has proved to my personal satisfaction that procedures based on the technical principles just enumerated are the most effectual. The principles of osseous technic do not rest primarily upon physiologic considerations but rather depend upon concrete propositions of physics and mechanics. In these osseous mechanics may be combined all the accepted forms of stress—axial, tort, lateral bending and shear.

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A Report on the Use of the African Clawed Frog (Xenopus Laevis Daudin) for Early Diagnosis of Pregnancy

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This report covers a series of 39 consecutive tests on 33 patients. All were females except one male suspected of having a teratoma. Full pertinent historical data are available for 31 of these.

METHODS

The test is essentially an interstitial-cell-stimulating hormone (ICSH) determination. Eighty cc. of morning urine are mixed with 160 cc. acetone; after 15 minutes the supernatant fluid is poured off and the precipitate dried, stirred with 2 cc. distilled water, and centrifuged. The supernatant fluid is drawn off, the pH is adjusted to 5.5 with 10 per cent sulfosalicylic acid, and injection in the amount of 1 cc. is made subcutaneously into each of two frogs. A positive result consists in the shedding of eggs within 12 hours. Extrusion of 4000 eggs (2000 by each frog) is not unusual. If no eggs have been shed at the end of 18 hours the test is considered negative and the frogs are rested for 1 week. Four weeks' rest are required after a positive result.

RESULTS

Results are summarized in Table I (tabulation only of tests in cases for which we had subsequent clinical confirmation).

TABLE 1
Results of Tests

	Positive		Negative		Total	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Correct	18	100.0	10	76.9	28	90.3
False	0	0.0	3	23.1	3	9.7
Total	18	100.0	13	100.0	31	100.0

It will be noted that there were no false positive tests. Of the three false negative tests, one was recorded in the ninth lunar month of a pregnancy, in the third month of which a positive result had been obtained. This is in keeping with the common finding of false negative Friedman and Aschheim-Zondek tests in the last trimester of pregnancy. The other two false negatives were obtained from patients in the first and second weeks of delay in menses; another test 1 week later was strongly positive and was subsequently clinically confirmed. This is in agreement with the results of other workers, although true positives have been recorded 2 weeks after the first day of missed menses. It is believed that the test can be made more sensitive by doubling the amount of urine used.

OBSERVATIONS OF CLINICAL INTEREST

In one case only 100 eggs (2 frog total) were shed in a test on November 27, 1945, following a

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Friedman test which had resulted in the death of the rabbit. Early in December the patient exhibited signs of threatened spontaneous abortion or ectopic pregnancy, and was placed under appropriate therapy. A normal viable child was delivered on July 8, 1946; on July 10, a retained placenta was removed by manual extraction under general anesthesia.

A second case, giving clinical evidence of a 6 weeks' pregnancy and yielding a 2 frog total of 1000 eggs, aborted spontaneously 4 days later.

A third case gave a 2 frog total of 4250 eggs after 11 days' delay in menses. A fourth case was a male suspected of teratoma. The negative test on this patient was followed by clinical confirmation that no teratoma existed.

CONCLUSION

The Xenopus test is simple, rapid and economical. So far as the results of these few cases can be taken as criteria we should say that it is accurate, that the positive result is unmistakable; that after 2 weeks' delay in menses, false negatives are not to be expected; that false positives are rare at any time. The test result is apparent in 5 to 12 hours or sooner.

Unlike other pregnancy tests, the Xenopus technic seems to possess quantitative aspects: weak positives, in particular, may indicate abnormal pregnancies (cases 1 and 2) or complications.

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An Evaluation of Routine Cephalopelvimetry of Sixty White Primiparas*

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INTRODUCTION

Cephalopelvimetry having been proved a safe and desirable procedure, the obstetrical committee of the Metropolitan Hospital, Philadelphia, established a mandatory routine radiographic examination of all primiparas, 10 days to 2 weeks before their expected date of delivery. This procedure was started October 1, 1945.

This paper will cover the first sixty cases examined and delivered from that date to and including August 20, 1946.

Multiparas examined during that period are not included in this series.

PURPOSE

The purpose of this paper is to evaluate our procedure of compulsory cephalopelvimetric x-ray examination of all primiparas.

I have not considered various methods used, since they have been capably described in the literature.[1, 2] Individual factors and equipment available help to determine the choice of method.

At the Metropolitan Hospital, we use the method of pelvimetry devised by Snow,[3] modified by determining the volume by a geometric formula (volume of sphere from known diameter) from the average diameters of the inlet, midpelvis, outlet and fetal skull. This modification was deemed advisable because of the experience of our obstetrical staff with the Ball technic[4] of cephalopelvimetry, which has been used for about 12 years in the x-ray department of the Philadelphia Osteopathic Hospital.

Basically, it was considered that only one method should be used so that proficiency in its use might better be acquired and the obstetricians become fully acquainted with its interpretations.

The obstetrical committee further specified that only the x-ray departments of the Philadelphia Osteopathic Hospital and Metropolitan Hospital should be the approved places for this procedure. This was done to eliminate as much as possible the human element of error, that computations might be made with a minimum of variation.

All of the cases in this series were seen by the Metropolitan Hospital x-ray department and computed by the Snow-Lewis method.

TECHNIC AND CONSIDERATIONS

The writer uses a routine of three 14 by 17 inch films: two for conventional technic and one for soft tissues of the abdomen, with chief attention to the placenta. If a breech presentation is noted, two more films are taken to examine the fetal head for size and position.

The following considerations are given to each case: (1) the size of the pelvis in two planes and at three levels; (2) the size of the fetal skull in two planes; (3) presentation of the fetus; (4) type of pelvis and its contour; (5) site of the placenta; (6) appearance and development of fetus; (7) uterine wall and size, and (8) single or multiple pregnancy.

The following can be visualized on these studies: (1) placenta previa, central or partial; (2) premature separation of placenta; (3) degree of hydramnios; (4) extrauterine pregnancy; (5) tumors which may cause dystocia; (6) plane of birth canal; (7) gross bone pathology of hips, pelvis, sacrum, coccyx and lumbar vertebrae.

This routine has been established as one measure to prevent or reduce fetal and maternal mortality and morbidity.

OBSERVATIONS

A summary of the cases of sixty primiparas observed and delivered is noted on the accompanying chart.

We did not observe any multiple births in this series. Twelve of the patients were over 30 years of age, with extremes at 18 and 42 years.

*Written as one of the requirements for certification by the American Osteopathic Board of Radiology.

The maternal pelvis is considered at three levels and two planes. At the inlet the volumetric measurements varied between 700 and 1472 milliliters. At this level, the smallest transverse conjugate measured 9.9 cm. while the largest was 14.5 cm. Transverse diameters were between 11.6 cm. and 15.0 cm., and the total diameters were, therefore, in the range between 22.2 cm. and 28.2 cm.

The midpelvic computations were recorded in the range between 525 milliliters and 1181 milliliters. In the anteroposterior diameter measurements were between 10.3 cm. and 14.7 cm., while the interspinous measurements ranged between 9.0 cm. and 12.1 cm. Total diameters were noted as 20.0 cm. for the smallest and 26.2 cm. for the largest.

Outlet volumes were between 250 milliliters and 842 milliliters. Posterosagittal diameters ranged between 6.2 cm. and 11.7 cm., while the tuberosity diameters were within the limits of 9.2 cm. and 12.5 cm. The total diameters ranged between 15.6 cm. and 23.3 cm.

The fetal diameters were averaged and placed between 8.9 cm., or an equivalent volume of 368 milliliters, and 10.7 cm., or an equivalent volume of 644 milliliters.

Fetal presentations were as follows:

Presentation	No. of Cases	Per Cent
L.O.A.	20	33.3
L.O.P.	8	13.3
L.O.T.	7	11.7
R.O.A.	10	16.7
R.O.P.	6	10.0
R.O.T.	5	8.3
Breech (L.S.A.)	3	5.0
Breech (R.S.A.)	1	1.7
Total	60	100.0

The placental sites were located:

Placental Site	No. of Cases	Per Cent
Anterior or Ventral	27	45.0
Superior or Fundus	7	11.7
Posterior	25	41.7
Low Ventral	1	1.6
Low Posterior	0	
Total	60	100.0

Disproportions were considered as either frank or borderline. This is based on two basic principles to determine dystocia. One is taken from the Ball technic and used at the Philadelphia Osteopathic Hospital. This is a volumetric difference between the maternal pelvis at the inlet and outlet, allowing for cranial molding and relaxation of soft parts. The difference at the inlet should not exceed 150 milliliters while at the outlet this variation is placed at 250 milliliters.

The second one is based on the Snow-Lewis method and chief consideration is on the size of the maternal pelvis, but allowing for a normal cranial measurement. In this method we should consider a case as one with potential dystocia if (a) inlet diameters total less than 22 cm. or 700 milliliters (volumetric conversion); (b) midpelvic diameters total less than 21.0 cm. or 608 milliliters: (c) outlet diameters total less than 16.0 cm. or 269 milliliters.

Secondary considerations must be given to the placental implantation, position of the fetus, bone structures and other factors enumerated at the beginning of this paper.

Considering all of these factors, four cases were determined as frank disproportions and eight cases as borderline. The cases of frank disproportions had small measurements in at least two planes, marked volumetric disproportion between pelvic plane and fetal skull, or breech presentation with a small pelvic measurement. One was small at the inlet and midpelvis (Hospital Case No. 18745) and the other (Hospital Case No. 18576) was small at the midpelvis and outlet. Case No. 19412 was a breech with a small midpelvic measurement and it was tabulated as disproportionate. The fourth (Hospital Case No. 19413) had a volumetric difference of 351 milliliters at the outlet and an old healed pubic fracture.

The borderline cases had only one small measured pelvic plane or a borderline volumetric difference between the fetal skull and pelvic (maternal) volume at one or more levels.

Three of our cases had flat sacral curves and all presented difficult or surgical deliveries.

Spalding's sign of fetal death was noted in one case (Hospital Case No. 18352). This was confirmed at delivery.

One case of hydramnios was reported (Hospital Case No. 18351). At delivery the obstetrician considered this confirmed since a slight hemorrhage was encountered and the patient lost about 300 cc. of blood.

One case (Hospital Case No. 18946) was reported as premature placental separation, with painless bleeding in the last trimester apparently due to low ventral or marginal implantation of the placenta.

Four of our cases were in breech presentation. In three cases, the maternal pelvis was average or above average in size; one patient had a small midpelvic plane. The approximate measurements of the fetal skulls were considered as average. Two of these patients had normal deliveries and two were done by cesarean section. Case No. 19305 was sectioned as the method of choice on the part of the referring doctor and obstetrician, while the other was considered as a frank disproportion.

Eight cesarean sections were performed in this series. Four of the cases were diagnosed roentgenologically as positive disproportions; three more were borderline disproportions. The eighth case was discussed under breech presentation. One of the borderline cases had a definite small midpelvic volume and inadequate total diameters. The other borderline patient (Hospital Case No. 19255) had a small midpelvis and at time of delivery, 2 weeks past the expected date, this was further complicated by a face presentation. A section was done, but the baby was stillborn. Case No. 19415 was borderline, and in view of our prior experience with a midpelvic measurement below 608 milliliters, or 21.0 cm. total diameter, it was decided that a cesarean section was the method of choice.

Of note is the high incidence of the use of outlet forceps in spite of normal measurements. Our staff uses outlet forceps routinely with caudal analgesia. This is considered normal obstetrical procedure with this form of analgesia and not a method of intervention. Julian Mines and E. A. Holroyd[8] have covered this in their extensive work with caudal analgesia in obstetrics at the Philadelphia Osteopathic Hospital.

In our series of sixty cases we had no maternal deaths. Four babies were stillborn. No cranial injuries were experienced in any of the babies.

ROUTINE CEPHALO-PEL

NO.	HOSPITAL	AGE	PELVIC TYPE	INLET TRANS.	INLET TOTAL	INLET VOLUME	MID PELVIS ANTERO-POST.	MID PELVIS LATERAL	MID PELVIS TOTAL	MID PELVIS VOLUME	OUT POST-SAG.	OUT TRANSVERSE
1	18351	20	GYNECOID	12.3 CM	13.5 CM	258 CM 1125 ML	12.7 CM	10.5 CM	23.2 CM	820 ML	7.0 CM	11.5 CM
2	18352	29	ANTHROPOID	13.7	13.7	27.4 1345	12.0	10.0	22.0	693	6.6	10.4
3	18372	24	GYNECOID	11.6	14.5	26.1 1181	11.1	12.0	23.1	820	9.0	11.2
4	18376	21	ANTHROPOID	12.5	12.9	25.4 1075	13.2	11.0	24.2	931	9.0	10.1
5	18412	28	ANTHROPOID	12.4	12.5	24.9 1025	13.2	9.5	22.7	779	9.7	10.1
6	18414	38	GYNECOID	11.7	13.5	25.2 1050	13.0	11.7	24.7	1003	8.6	10.5
7	18502	24	GYN-ANTHR.	12.6	13.6	26.2 1181	12.0	10.0	22.0	693	7.0	10.3
8	18514	26	ANTHROPOID	12.0	12.5	24.5 979	13.0	10.5	23.5	864	8.4	10.9
9	18546	28	ANTHROPOID	12.0	12.5	24.5 979	14.0	9.0	23.0	798	7.2	10.0
10	18576	26	GYNECOID	10.4	12.0	22.4 739	10.6	9.5	20.1	541	6.4	9.2
11	18606	26	GYNECOID	12.9	14.0	26.9 1290	11.5	11.8	23.3	842	8.2	12.2
12	18615	36	GYNECOID	11.4	14.0	25.4 1075	10.6	10.1	20.7	589	7.4	10.5
13	18623	22	GYNECOID	12.0	14.0	26.0 1153	11.6	10.1	21.7	680	6.2	10.0
14	18680	28	GYNECOID	11.7	14.0	25.7 1020	12.0	10.6	22.6	738	8.4	10.5
15	18683	19	ANTHROPOID	13.4	13.0	26.4 1209	13.2	9.5	22.7	779	7.7	9.7
16	18689	22	ANTHROPOID	14.5	13.5	28.0 1441	14.0	11.0	25.0	1025	7.2	11.2
17	18699	21	GYNECOID	12.5	14.0	26.5 1237	13.2	11.5	24.7	1003	8.6	11.2
18	18731	24	ANTHROPOID	14.5	13.2	27.7 1425	15.7	12.1	26.8	1145	9.0	12.5
19	18745	26	GYNECOID	10.2	12.0	22.2 700	10.5	9.5	20.0	525	9.5	9.8
20	18804	21	GYN-ANTHR.	12.7	14.0	26.7 1260	13.0	10.9	23.9	907	10.0	11.5
21	18819	19	ANTHROPOID	12.6	12.6	25.2 1165	12.5	10.5	23.0	798	8.0	10.0
22	18822	18	GYNECOID	10.7	12.6	23.3 842	11.5	10.1	21.6	662	9.0	9.6
23	18824	24	GYNECOID	11.6	13.7	25.3 1075	12.5	10.0	22.5	759	8.7	10.2
24	18835	22	ANTHROPOID	12.0	12.7	24.7 1000	12.2	10.0	22.2	700	8.2	10.5
25	18847	21	GYN-ANTHR.	12.4	13.5	25.9 1153	12.5	10.7	23.2	820	8.1	10.7
26	18848	34	GYNECOID	12.0	13.7	25.7 1125	12.2	10.8	23.0	798	8.0	11.6
27	18896	35	ANTHROPOID	13.1	13.6	26.7 1265	14.7	11.5	26.2	1181	10.0	12.0
28	18900	22	GYNECOID	12.2	13.0	25.2 1058	12.6	9.9	22.4	739	8.7	11.4
29	18910	21	ANTHROPOID	12.8	12.5	25.3 1025	12.2	9.2	21.4	644	7.9	10.0
30	18946	27	GYNECOID	11.0	13.6	24.6 979	11.2	11.1	22.3	739	9.4	11.2
31	18952	39	ANTHROPOID	12.5	12.4	24.9 1025	13.0	10.0	23.0	798	8.4	10.5
32	18959	19	GYNECOID	11.0	12.0	23.0 798	11.2	9.0	20.2	541	9.0	10.0
33	18974	27	GYNECOID	12.2	14.2	26.4 1209	13.2	10.5	23.7	886	9.7	11.7
34	18990	38	GYNECOID	12.6	13.6	26.2 1181	13.5	11.0	24.5	978	7.5	10.5
35	19049	20	ANTHROPOID	12.5	12.5	25.0 1025	13.4	10.3	23.7	886	9.7	10.2
36	19091	20	GYNECOID	12.4	13.2	25.6 1100	11.4	10.7	22.1	719	9.0	12.0
37	19100	29	GYN-FLAT	9.9	13.0	22.9 798	10.3	10.9	21.2	626	6.5	11.2
38	19112	24	GYNECOID	12.7	13.0	25.7 1125	11.6	9.4	21.0	608	8.0	10.4
39	19120	31	GYNECOID	12.7	14.0	26.7 1265	12.0	11.4	23.4	842	7.1	12.0
40	19155	18	ANTHROPOID	13.2	12.4	25.6 1100	11.4	10.4	21.8	680	6.7	11.5
41	19162	24	GYNECOID	11.5	14.5	26.0 1153	12.0	10.7	22.7	779	9.2	11.0
42	19164	28	GYNECOID	13.0	12.7	25.7 1125	12.5	10.4	22.9	798	7.7	11.1
43	19255	36	ANTHROPOID	11.0	11.8	22.8 779	12.0	9.0	21.0	608	7.7	11.3
44	19260	22	GYNECOID	12.5	13.2	25.7 1125	12.2	9.5	21.7	680	11.7	11.6
45	19267	18	GYNECOID	12.0	13.6	25.6 1100	12.5	11.0	23.5	864	9.0	11.1
46	19290	21	GYNECOID	11.0	13.7	24.7 1003	12.0	11.2	23.2	820	9.0	11.0
47	19305	24	GYNECOID	12.0	13.0	25.0 1025	13.1	10.4	23.5	864	10.5	10.6
48	19313	34	GYNECOID	11.5	13.2	24.7 1003	12.0	12.0	24.0	907	7.5	11.5
49	19330	25	GYNECOID	11.3	12.5	23.8 886	10.8	9.9	20.7	589	8.6	10.0
50	19331	25	GYNECOID	11.3	13.0	24.3 955	11.6	11.7	23.3	842	8.7	11.0
51	19356	21	GYN-ANTHR.	13.5	12.4	25.9 1153	14.0	10.0	24.0	907	9.5	11.0
52	19376	34	ANTHROPOID	13.5	13.5	27.0 1292	12.8	10.4	23.2	820	7.9	10.6
53	19381	42	GYN-FLAT	11.6	15.0	26.6 1237	11.6	10.7	22.3	739	7.0	10.8
54	19386	25	GYN-ANTHR	12.1	11.6	23.7 886	12.1	10.8	22.9	798	9.5	10.5
55	19395	20	GYNECOID	11.5	13.4	24.9 1025	11.7	10.7	22.4	739	11.5	11.5
56	19396	19	ANTHROPOID	14.5	13.7	28.2 1472	13.8	10.5	24.3	955	8.0	11.4
57	19411	25	ANTHROPOID	12.5	13.0	25.5 1100	12.6	10.5	23.1	820	8.2	11.0
58	19412	31	GYN-ANTHR	10.8	12.0	22.8 779	10.8	9.5	20.3	557	7.5	9.6
59	19413	21	ANTHROPOID	12.1	12.0	24.1 930	13.0	9.5	22.5	759	6.5	10.0
60	19415	19	ANTHROPOID	12.2	12.0	24.2 930	11.7	9.0	20.7	589	6.7	9.5

VIMETRY OF 60 PRIMIPARAS

LET		FETAL CRANIUM					PLACENTAL IMPLANTATION	X RAY IMPRESSION	OBSTETRICAL
Total	Volume	Skull Dim	Skull Perim	Skull Volume	Presentation				
18.5cm	415 ML	10.7cm	35.5cm	644 ML	CEPHALIC	ROA	SUPERIOR	NO DISPROPORTION HYDRAMNIOS	300 CC BLOOD LOSS OUTLET FORCEPS-NORMAL BABY
17.0	313	8.9	30.0	368		ROA	VENTRAL	NO DISPROPORTION - FETAL DEATH (SPALDING SIGN)	NORMAL DELIVERY STILLBORN
20.2	541	10.6	35.0	626		ROA	VENTRAL	NO DISPROPORTION	MID FORCEPS NORMAL BABY
19.1	453	10.0	33.0	525		ROA	VENTRAL	NO DISPROPORTION	NORMAL DELIVERY NORMAL BABY
19.8	507	9.4	32.0	426		ROP	VENTRAL	NO DISPROPORTION	NORMAL BABY NORMAL DELIVERY
191	453	9.2	31.0	405		LOP	VENTRAL	NO DISPROPORTION	NORMAL DELIVERY STILLBORN
17.3	340	10.1	33.0	541		LOT	SUPERIOR POSTERIOR	NO DISPROPORTION	NORMAL DELIVERY NORMAL BABY
19.3	471	10.0	33.0	525		LOA	POSTERIOR	NO DISPROPORTION PREMATURE PLACENTAL SEPARAT	NORMAL DELIVERY NORMAL BABY
17.2	327	9.3	31.0	415		LOA	VENTRAL	NO DISPROPORTION	NORMAL DELIVERY NORMAL BABY
15.6	250	9.7	32.5	471		ROP	SUPERIOR	DISPROPORTION	CEASARIAN - LONG LABOR NORMAL BABY
20.4	537	10.4	34.0	589		ROA	SUPERIOR	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
17.9	383	10.2	33.5	557		LOP	VENTRAL	BORDERLINE - SMALL MID-PELVIS	DIFFICULT LABOR OUTLET FORCEPS - NORMAL BABY
16.2	277	10.1	33.0	541		LOA	SUPERIOR	BORDERLINE - OUTLET VOL. MINUS 264 ML WITH SKULL VOL	NORMAL BABY OUTLET FORCEPS
18.9	436	10.6	35.0	608		LOA	VENTRAL	NO DISPROPORTION	NORMAL BABY OUTLET FORCEPS
17.4	340	10.3	34.0	575		ROP	SUPERIOR	BORDERLINE - OUTLET VOL. MINUS 235 ML WITH SKULL VOL	NORMAL LARGE BABY OUTLET FORCEPS
18.4	405	9.3	31.5	415		ROT	VENTRAL	NO DISPROPORTION	NORMAL SPONTANEOUS DELIVERY - NORMAL BABY
19.8	507	AVERAGE SIZE NOT COMPUTED			BREECH	LSA	VENTRAL	AVERAGE SIZE PELVIS BREECH - NO DISPROPOR.	SPONTANEOUS DELIVERY SACRAL - NORMAL BABY
21.5	675	10.2	33.5	557	CEPHALIC	LOA	POSTERIOR	NO DISPROPORTION	NORMAL DELIVERY NORMAL BABY
19.3	450	10.3	34.0	575		LOA	VENTRAL	DISPROPORTION - SMALL INLET AND PELVIS - FLAT SACRUM	NO ENLARGEMENT - NORMAL BABY - CESAREAN
21.5	666	10.2	33.5	557		LOA	VENTRAL	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
18.0	383	9.4	32.0	430		LOA	VENTRAL	NO DISPROPORTION	SPONTANEOUS NORMAL BABY
18.6	415	10.0	33.0	525		LOA	POSTERIOR	NO DISPROPORTION	NORMAL BABY OUTLET FORCEPS
189	466	10.5	35.0	607		LOA	POSTERIOR	NO DISPROPORTION	NORMAL BABY OUTLET FORCEPS
18.7	400	9.1	31.0	390		ROP	VENTRAL	NO DISPROPORTION	SPONTANEOUS NORMAL BABY
188	426	10.0	33.0	625		LOP	POSTERIOR	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
19.6	589	10.2	33.5	557		ROT	POSTERIOR	NO DISPROPORTION - HEALED SACRAL FRACTURE	SPONTANEOUS NORMAL BABY
22.0	699	9.6	32.0	453		ROA	VENTRAL	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
20.1	541	10.2	33.5	557		LOA	POSTERIOR	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
17.9	383	9.9	33.0	507		LOA	VENTRAL	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
20.6	573	10.2	33.5	557		LOA	LOW VENTRAL	NO DISPROPORTION LOW PLACENTA	BLEEDING 3RD TRIMESTER MID FORCEPS NORMAL BABY
18.9	436	9.9	33.0	507		LOA	POSTERIOR	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
19.0	436	9.7	32.5	471		ROA	POSTERIOR	BORDERLINE - SMALL MID-PELVIS	SLOW DIFFICULT LABOR OUTLET FORCEPS - NORMAL BABY
21.4	664	10.2	33.5	557		ROA	VENTRAL	NO DISPROPORTION	SPONTANEOUS DELIVERY NORMAL BABY
18.0	382	10.2	33.5	557		LOA	POSTERIOR	NO DISPROPORTION	MID FORCEPS NORMAL BABY
19.9	525	9.4	32.0	426		ROP	POSTERIOR	NO DISPROPORTION	SPONTANEOUS DELIVERY NORMAL BABY
21.0	608	9.4	32.0	426		ROA	VENTRAL	NO DISPROPORTION	SPONTANEOUS DELIVERY NORMAL BABY
17.7	368	9.7	32.5	471		LOP	POSTERIOR	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
18.4	405	9.7	32.5	471		LOT	VENTRAL	BORDERLINE - SMALL MID PELVIS - FLAT SACRUM	SLOW LABOR - OUTLET FORCEPS - NORMAL BABY
191	453	10.2	33.5	557		LOP	VENTRAL	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
18.2	394	9.4	32.0	426		ROT	VENTRAL	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
20.2	541	10.0	33.0	525		ROT	POSTERIOR	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
18.8	426	9.4	32.0	426		LOT	POSTERIOR	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
19.0	436	9.7	32.5	471		LOP	VENTRAL	BORDERLINE SMALL MID PELVIS	FACE PRESENTATION - 2 WKS POST DUE - CEASARIAN - STILLBORN
23.3	842	10.5	35.0	608		LOT	VENTRAL	NO DISPROPORTION	SPONTANEOUS DELIVERY NORMAL BABY
20.1	537	9.7	32.5	471		LOA	POSTERIOR	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
20.0	525	9.9	33.0	507		LOA	POSTERIOR	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
21.1	626	AVERAGE SIZE NOT COMPUTED			BREECH	LSA	POSTERIOR	BREECH - AVERAGE SIZE PELVIS - NO DISPROPORTION	CEASARIAN (METHOD OF CHOICE) NORMAL BABY
19.0	436	AVERAGE SIZE NOT COMPUTED			BREECH	LSA	POSTERIOR	BREECH - AVERAGE SIZE PELVIS - NO DISPROPORTION	SPONTANEOUS DELIVERY NORMAL BABY
18.6	415	10.3	34.0	575	CEPHALIC	LOA	POSTERIOR	BORDERLINE SMALL MID PELVIS	CEASARIAN - NORMAL BABY
19.7	507	9.8	33.0	489		ROT	POSTERIOR	NO DISPROPORTION	SPONTANEOUS DELIVERY NORMAL BABY
20.5	573	9.9	33.0	507		LOT	POSTERIOR	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
18.5	415	10.0	33.0	525		LOP	VENTRAL	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
17.8	368	9.7	32.5	471		LOT	VENTRAL	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
20.0	525	9.5	32.0	436		LOA	POSTERIOR	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
23.0	798	8.9	30.0	368		LOP	POSTERIOR	NO DISPROPORTION	SPONTANEOUS DELIVERY STILLBORN
19.4	471	9.4	32.0	426		LOT	SUPERIOR POSTERIOR	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
19.2	453	9.6	32.0	453		ROP	VENTRAL	NO DISPROPORTION	OUTLET FORCEPS NORMAL BABY
17.1	327	AVERAGE SIZE NOT COMPUTED			BREECH	RSA	VENTRAL	DISPROPORTION - BREECH SMALL MID PELVIS	CEASARIAN
16.5	293	10.7	36.0	644	CEPHALIC	ROA	POSTERIOR	DISPROPORTION - MINUS 351 ML AT OUTLET - HEALED PUBIC FRACTURE	NORMAL BABY CEASARIAN NORMAL BABY
16.2	277	9.5	32.0	436		LOA	POSTERIOR	BORDERLINE - SMALL MID PELVIS	CEASARIAN NORMAL BABY

SUMMARY

Computations of cephalopelvimetry, established as a routine compulsory procedure in the Metropolitan Hospital, Philadelphia, in sixty cases of white primiparas are evaluated.

Twenty cases, 33.3 per cent of the series, had x-ray evidence of abnormal findings, fetal or maternal.

Four frank disproportions were noted and cesarean sections were done. Normal babies were delivered in all cases with no maternal mortality.

Eight cases were borderline disproportions. Three patients were delivered by cesarean sections; one was delivered by midforceps and the other four by outlet forceps. One of the babies was stillborn; there was no maternal mortality.

Criteria of disproportions are: (1) a volumetric difference between fetal skull and inlet of the pelvis of 150 milliliters, or at the outlet of the pelvis of 250 milliliters, provided no molding is present; (2) the volume or diameter of the pelvis at the inlet, midpelvic and outlet planes. A measurement which is less than 700 milliliters or a total diameter of 22.0 cm. at the inlet, or a midpelvic volume of 608 milliliters or 21.0 cm. total diameter, and at the outlet if less than 269 milliliters or 16.0 cm., should be considered as incompatible with normal labor.

Eight cesarean sections were done, seven of which were predictable and one was elective. No maternal deaths were encountered. No cranial injuries were seen in the babies delivered. Four were stillborn, one of which was predicted prior to delivery.

CONCLUSIONS

Twenty cases, or 33.3 per cent of the total series, had evidence of abnormal findings so that the obstetrician was forewarned of possible complications.

In this small series of sixty white primiparas, cephalopelvimetry has definitely established itself as a procedure of merit to prevent maternal death, unnecessary labor and cranial injuries to the fetal skull.

Cephalopelvimetry is an established part of modern obstetrics and should be compulsory routine procedure for all primiparas. Moreover, the writer is in full accord with P. T. Lloyd,[9] our consultant radiologist, who thinks that this routine procedure should be extended to include all multiparas who have a history of prior difficult labor or puerperal complications.

The best time for the examination is 10 days to 2 weeks before the expected date of delivery.

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Undulant Fever and the Public Health*

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Undulant fever is a specific, septicemic infection of man, of indefinite duration and with an irregular course. It is particularly distinguished by its diffuse reticuloendothelial and granulomatous effect. This diffuse effect accounts for the fact that almost any tissue of the body may be affected. The result is an atypical bizarre disease in most instances difficult to diagnose.

The organisms responsible for this disease are: Brucella abortus, Brucella melitensis, Brucella suis. Whether these three organisms represent actual differences in bacteria, or whether they represent simply mutations of the same organism which result from cultural, environmental and virulency factors is an interesting speculation. The work of Mellon[1] who reports experimentally changing the typical organism of avian tuberculosis through seven stages of complete change in morphologic, cultural and staining characteristics from the parent organism and then back again to the original type by aging and cultural methods, affords grounds for reflection on the similarities between undulant fever and rheumatic fever, tuberculosis, virus pneumonitis and others. It indicates the need for intensified mutation studies in other diseases. The Brucella organism has been called a fastidious bacterium because of the difficulty in culturing it.

In work at Duke University[2] it was discovered that the cultures of the lymph nodes of 19 cases of Hodgkin's disease yielded 10 strong, positive cultures of the Brucella organism, especially Brucella suis and Brucella melitensis. Cultures of enlarged lymph glands in patients with chronic undulant fever without Hodgkin's disease demonstrated 3 patients who were positive for Brucella melitensis and Brucella suis. A control series of 67 lymph node cultures at routine biopsy showed Brucella suis in only one instance. Benning[3] states that the only consistent feature of the Brucella organism is its extraordinary versatility or adaptability to growth in animal tissue. For the most part, however, the tissue changes produced are reversible so that symptoms are established on a clinical rather than a structural basis.

A number of types of undulant fever have been carefully classified and adequately described in texts. It is estimated that only about 10 per cent of undulant fever cases are acute; this phase presents a fairly

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typical picture. Though the acute condition is serious and may be fatal, the chronic phase of the disease poses questions in diagnosis and treatment which far transend it in importance. In contrast to the acute disease, chronic undulant fever has been recognized in relatively few areas of the United States. When a large number of cases has been discovered in a certain region, it has been largely the result of a determined effort on the part of a few investigators to learn the true incidence of this disease. Hardy[4] reported the occurrence of 1,669 cases in one state (Iowa) from 1925 to 1935. Urschel[5] tested 124 patients (Indiana) with suggestive histories for undulant fever by means of the intradermal test. Seventy of these, or 56.4 per cent, gave a positive skin reaction to the vaccine of Brucella abortus and Brucella suis. Fifty-three, or 42.8 per cent, were considered to have clinically active undulant fever. Reports from widely separated sections of the United States indicate comparable statistics. In spite of these spot checks there are those who would be of the belief that these are the only foci of the infection. In contrast to this it is my opinion that the disease may be encountered wherever animal reservoirs of infection exist.

Chronic undulant fever is a disease presenting a clinical picture which may be characterized by a complete lack of objective findings and yet the patient may complain of marked weakness and fatigue so that in most instances the disease will be diagnosed as neurocirculatory asthenia, neurosis or constitutional inadequacy. Chronic undulant fever may present itself with a single symptom of perhaps backache or headache or any one, or groups, of the 150 symptoms which have been attributed to it. The central nervous system is often involved and the case is diagnosed as psychosis or as thyrotoxicosis. Victims of arthritis who are not responding to therapy, and those with rheumatic fever who are not doing well under appropriate management, may have undulant fever.

Pray[6] observed 40 cases in children and listed the most prominent symptoms in the following order of frequency: Nervousness in 70 per cent, head colds and fevers in 65 per cent, diseased tonsils and adenoids in 56 per cent, abdominal pain in 32 per cent, sweating in 30 per cent, headache and cardiac disorders in 20 per cent, enlarged liver and spleen in about 5 per cent. In his opinion, undulant fever is capable of involving the nervous system to such an extent as to cause typical chorea. He also states that diseased tonsils and adenoids may be caused by Brucella abortus.

There is abundant evidence[7] that undulant fever causes disease throughout the respiratory tract and the pulmonary changes reported have not been distinguished from those associated with chronic sinusitis. Sinusitis and pansinusitis with bronchiectasis, slowly resolving bronchopneumonia, lung abscess and chronic bronchitis, all of which predispose to bronchiectasis, have been reported associated with undulant fever. All the criteria necessary for bronchiectasis are afforded by Brucella infection:

(1) It localizes in the respiratory tract and may remain dormant for years.

(2) It is resistant to treatment.

(3) It may simultaneously cause mucosal infection throughout the respiratory tract, and

(4) It frequently initiates colds and other acute respiratory infections.

In short, this disease is a greater imitator than syphilis or tuberculosis.

Evans[8] has made the statement that undulant fever challenges the right of the physician to make a diagnosis of neurasthenia. Davis[9] has asked the following questions which should receive consideration: "How many thousands of misfit children — 'bright enough' but unable to concentrate, inattentive and exasperating—are overstimulated by a septicemia which produces an undemonstrable cerebrospinal irritation? How many of our youth with a pitifully inadequate physical and emotional balance are criminals as a result of the same overstimulation? . . .

"How many of our antisocial adults—'brilliant people'—who are unable to adjust their emotional beings to a cooperative society, are afflicted with brucellosis? They are among those who have not the will to succeed nor the will to progress.

"How many divorces are the result of this same series of conflicts, brought on by glandular imbalance following infection with the brucellosis organisms; and what percentage of those judged legally insane are victims of brucellosis?" He adds to this his personal comment that he has been informed that a larger per cent of the inmates of one of the state institutions are Brucella victims than are syphilitic, and that he would prefer a diagnosis on himself of syphilis rather than of brucellosis because of the greater specificity of antisyphilitic treatment.

Goats, cattle, swine, rabbits, as well as sheep, horses, dogs, mules, poultry, wild deer and buffalo all may serve as reservoirs of Brucella infection, although the animals of the latter group are probably not an important source. The occurrence in horses[10] may indicate the reason for recurrence of the disease among other farm animals after supposedly disposing of affected dairy cattle, swine and goats. The organism has been found alive in soil more than 3 months after it has been infected by fecal discharges and putrefied tissues, after 2 months in Rocquefort cheese, 4 months in refrigerated butter, and 10 days in refrigerated milk. Infection of cattle may take place through the ingestion of contaminated food, through the conjunctival sac, and through normal or minutely abraded skin by pressure or friction. The spread of infection to man may take place in any one of several ways:

(1) By ingestion of, or contact with, raw infected milk or milk products or milk incorrectly sterilized.

(2) By contact with discharges of the aborted fetus and its membranes from infected cattle (veterinary surgeons).

(3) By contact with infected animals or carcasses.

Direct transmission of the disease from man to man, or through insect vectors, has not been demonstrated.

Diagnosis of this disease is based upon three factors: (1) awareness of the disease; (2) suspicion of the individual case; and (3) laboratory findings.

The laboratory methods which were regarded as most useful are[11]: (1) the Brucellergen intradermal test; (2) the opsonic (opsonocytophagic) test; (3) the rapid agglutination test; (4) culture (isolation of Brucella organism).

It is unnecessary to outline fully the technics of these tests. An excellent description of them will be found in the *Journal of the American Medical Association*.[11]

The proper laboratory investigation of a suspected case of undulant fever requires not only the proper

conduct of the laboratory procedure, which is predicated upon the availability of a highly trained technician, but also the skillful interpretation of the laboratory findings when they are obtained. The brucellergen skin test is negative if erythema alone is present. A negative skin test will usually rule out brucellosis. The brucellergen test is positive if, in addition to an area of redness, there is also edema or induration, which measures from 0.5 to 7.5 centimeters or more in diameter. A positive test is specific for sensitization to Brucella organisms and is due to past or present infection. It does not, however, indicate the patient's status of immunity which may then be obtained by the opsonic test.

The Brucella opsonic test in a subject reacting negatively to the intradermal test will almost always show little or no phagocytosis. A subject reacting positively to the intradermal test is classified as infected when less than 40 per cent of his polymorphonuclear leukocytes show phagocytosis; as infected but with questionable immunity if from 40 to 60 per cent of them show marked phagocytosis; as immune when 60 per cent or more show marked phagocytosis in the Brucella organisms.

A negative agglutination test does not rule out brucellosis. A positive agglutination test consists of complete agglutination in a titer over 1 to 25. A positive culture may be obtained from various of the body secretions, especially in acute cases, and to demonstrate carriers of the disease the culture is the only absolutely unequivocal method of diagnosis. The organism is so difficult to grow, however, and is so fastidious in its choice of culture media that very few active cases of undulant fever will ever show a positive culture. In this connection, a culture medium has been described by Kleeberg[12] which supposedly offers certain advantages over those now in ordinary use. Cross agglutinations may occur in patients ill with tularemia and may show a low titer for Brucella. The serum treated with cholera vaccine and those infected with cholera may also agglutinate Brucella antigen. In addition, it has been reported that the serum of 3 to 9 per cent of tuberculous patients will give falsely positive reactions to the tests. Most of the agglutinations however, occur at low titers. In these cases, it is likely that the intradermal reaction to Brucella and the opsonic test will be negative.

Various types of treatment have been reported for this disease, including the sulfonamides, various types of dyes, colloidal intravenous solutions, vaccines, serums and many others. Like other diseases in which there are many treatments, probably none of them are of any great value. In my experience vaccine therapy continued over a period of from 18 months to 3 years at 3 to 5 day intervals and using a very slow increase in dose has been very satisfactory. In my opinion, vaccine therapy, artificial fever, and streptomycin may offer more therapeutic hope.

The most important consideration in this disease is that it is preventable. Vaccination of calves with Brucella abortus strain 19 may assist in producing immunity in cattle, and reduction of the infection. Nearly 40,000 calves were vaccinated in the United States in one month, April, 1944, while in the same month 13,000 cattle were slaughtered as positive reactors to the disease[13]. It has been demonstrated that pasteurization will destroy the Brucella organism in milk. The universal use of strictly supervised pasteurization will eliminate milk and milk products as a source of infection. Education of the public is necessary and particularly of the persons employed in farming, slaughtering or veterinary medicine. Farmers and veterinarians, treating abortion in cattle, should wear rubber gloves and masks. Meat handlers in the slaughterhouses should take the same precautions. Rigid control by frequent testing and disposal of infected animals, is necessary as well as recognition that stables and pastures and the water supply become infected when used by animal carriers of the disease. Active immunization of the human being may be possible and practical in the near future.

SUMMARY

No attempt has been made to give a complete discussion of the subject of undulant fever. The literature is scattered. Research has been wholly carried out only in a few small areas. This paper has been merely an attempt to focus attention on a disease which is of the utmost importance to the public health since it is considered that approximately 10 per cent of the population is afflicted with it.

One would expect more interest in a disease which increased 14,000 per cent in reported cases between 1925 and 1940. It has now been 41 years since Craig[14] described the first authentic case of undulant fever in the United States. In 1942, Davis[8] made a prediction concerning this disease to the effect that, in his opinion, it would become one of the most discussed and probably accepted as one of the most important major public health problems in the United States within 5 years. This is the fifth year since the publication of that paper and as yet his prediction has not been realized. Lack of a concerted antiundulant fever campaign would seem to indicate that the mothers of American children at least are not aware of the danger of raw milk to their children's health, since raw milk continues to be sold widely from barns inadequately supervised. Certainly one might expect mothers to take a stand in this regard, whether other groups were equally interested or not. Perhaps an estimation of the cost to the individual taxpayer of suffering this disease to exist would make a more forceful argument for its control. Reform certainly would follow an accurate report of the moneys spent in the support of public charges, in crime prevention, and loss of national income caused by this disease.

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The Treatment of Subacute Bacterial Endocarditis

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In considering the therapy of subacute bacterial endocarditis we are met at the outset by the dramatically changing therapeutic outlook. The new antibiotics have already proved to be a great advance in the treatment of this disease, which previously was almost invariably fatal. The change can best be appreciated by studying a summary of 347 cases of subacute bacterial endocarditis treated at the Peter Bent Brigham Hospital from 1913 through 1944.[1] The summary brings out the following three points:

1. During the "presulfonamide era" (1913-1937) 237 patients were treated. Of these 218 died in the hospital; the remainder were discharged critically ill. There were no known recoveries.

2. During the "sulfonamide era" (1937-1944) 90 cases were treated. Of these 35 were not diagnosed soon enough or were inadequately treated, and 55 received adequate treatment; 39 of the latter received sulfonamides alone with no recoveries; 16 received combined sulfonamide-fever therapy with 4 recoveries.

3. During the "penicillin era" (January 1944 until that article was written) 20 patients were treated, 17 with "adequate course of penicillin"; 3 received no penicillin (2 were diagnosed post-mortem and 1 was admitted in terminal uremia). Eleven of the adequately treated patients responded to penicillin therapy and have remained well for 6 to 18 months after treatment. Five of the 6 deaths were attributed respectively to congestive heart failure, general septicemia (Alcaligenes faecalis), a ruptured spleen, coronary occlusion and massive hemorrhage from a bronchus. The sixth case was considered inadequately treated.

This therapeutic change has placed an added responsibility upon the physician in terms of early diagnosis of the disease. The diagnosis should be made as quickly as possible, for in early cases less penicillin and a shorter course of treatment will be required.

As a rule, patients who develop subacute bacterial endocarditis have had a heart murmur for years, but otherwise have been in good health. The disease practically never develops in a normal heart, and occurs most frequently in those which have some abnormality of the valve leaflets or adjacent endocardium, of either congenital or rheumatic origin. In brief, subacute bacterial endocarditis is most frequently encountered in congenital lesions, in mitral and aortic insufficiencies due to a previous rheumatic endocarditis, and in compensated mitral stenosis with a normal cardiac rhythm. Only infrequently does it develop in patients with auricular fibrillation or with symptoms or signs of congestive heart failure. One should suspect its presence in any patient with valvular heart disease who has an unexplained fever for more than a week, particularly if there is a history of tooth extraction or dental manipulation prior to the onset of the symptoms. In the early stages of the disease the usual findings of changing heart murmur, fever, embolic phenomena, splenomegaly and anemia may be absent and the correct diagnosis can be established only upon the finding of Streptococcus viridans in the blood stream. This organism is the offender in 95 per cent of the cases of subacute bacterial endocarditis. The remaining 5 per cent are caused by nonhemolytic or hemolytic streptococci.

The offending organism should be recovered before specific therapy is started in any case, not only for diagnostic purposes, but also to determine the in vitro sensitivity of the organisms to available antibiotics. A rational plan of treatment can best be formulated upon the correlation of the in vitro sensitivity of the infecting organisms to penicillin. Strains of organisms inhibited by 0.1 unit per cubic centimeter or less can be eradicated in most instances. Those requiring up to 0.5 units are more resistant clinically; when the in vitro sensitivity of the strain is between 0.5 and 10 units, even greater resistance is encountered.

It must be realized that the treatment of subacute bacterial endocarditis is difficult and involved. Nothing should be left undone because of any possible unfavorable psychologic effect upon the patient. The patient's chances of recovery must not be jeopardized because the physician hesitates to alarm him by the initiation of a necessary detail of management. The objective of the treatment should be three-fold: supportive, specific and prophylactic. The patient must be placed where he can be cared for best and where he is to stay until recovery is complete; he should therefore be hospitalized.

SUPPORTIVE TREATMENT

1. When the patient is febrile, absolute bed rest should be insisted upon, but in order to help maintain body weight and strength, his position in bed should be changed frequently. Sitting up in bed with proper support or in an arm chair can be permitted.

When the temperature has returned to normal and remains so for a period of at least 5 days, and if the patient feels well enough to enjoy it, he should be encouraged to sit up, to move about and even to go outdoors. Climbing stairs, exposure and fatigue must be avoided. The return to normal activities should be gradual and in proportion to his cardiac capacity.

2. No matter how ill the patient may be, his general resistance must be maintained. This can best be accomplished by the ingestion of nutritious food. In general the patient should be allowed to eat all the food he is capable of digesting and absorbing. Since this illness is very frequently of long duration and marked asthenia is not unusual, the patient should be carefully fed and his appetite should be stimulated with various delicacies.

What to feed the patient ill with subacute bacterial endocarditis depends upon the time in the course of the disease. If it is late a full diet should be given a trial. If it is early the diet depends upon the severity of the illness. If the patient is very acutely ill he should not be disturbed by frequent attempts to feed him. He should be allowed to eat what he likes, and if he has no desire

for food it will make very little difference, provided the duration of this attitude is not too long. During this interval, if necessary, glucose and proteins can be given intravenously so long as saline solution and rapidity of injection are avoided. Usually a liquid diet is given during the first few days of the disease. As the patient gradually progresses he is given a soft diet and later a general diet. The diet should be high in caloric content, from 3,000 to 6,000 calories a day, with sufficient energy value to attempt to maintain normal body weight. It should contain at least 1 gram of protein for each kilogram of normal body weight and should be supplemented with all the essential vitamins and minerals. Supplementary vitamins and synthetic proteins are helpful.

3. Blood transfusions are helpful and particularly indicated if the total erythrocyte count drops rapidly and progressively to under 3,000,000.

4. Osteopathic manipulative therapy should be directed particularly to the cervical and thoracic regions. The treatment should be of short duration and should not exaggerate the existing fatigue.

5. Mild sedatives may be necessary during the day and the shorter acting barbiturates should be used at night.

6. Oxygen is invaluable if heart failure should occur, and in some instances of cerebral emboli.

SPECIFIC TREATMENT

Penicillin, at present, appears to be the most effective specific treatment for subacute bacterial endocarditis. When the drug was first used disappointing results were obtained because, as Loewe[2] and his collaborators pointed out, "the dose was too small."

The daily dosage of penicillin and duration of treatment vary in different patients, but certain general principles can be suggested.

1. At least 2 to 3 weeks of uninterrupted therapy should be given.

2. The daily dosage should be that which attains average blood levels of four or five times the amount required for in vitro inhibition of the infecting strain. For the average case this dose will be between 500,000 and 1,000,000 units each 24 hours.

3. If the blood cultures remain sterile for 2 weeks after the penicillin has been discontinued, the possibility of a cure can be considered. If positive cultures are again obtained, a similar course of treatment with penicillin at a higher daily dosage is recommended. Doses of penicillin as high as 20,000,000 units a day have cured the infection of some patients in which many months of therapy with from 2,000,000 to 10,000,000 units daily has failed. The upper limit of human tolerance to penicillin has not yet been established, and it may be that as larger amounts of the drug become available, still higher doses will be found effective in the extremely refractory cases.

Penicillin is best given by fractional intramuscular injections at 2 or 3 hour intervals. It can also be given by the continual intravenous drip using approximately 1200 to 2500 cc. of a 5 per cent glucose solution as a vehicle for the desired amount of penicillin. It is best to avoid a solution of saline as the patients already have organic heart disease and may develop congestive heart failure or acute pulmonary edema.

Since streptomycin may soon be generally available, the therapeutic use of this drug in subacute bacterial endocarditis is of interest at this time. It must, however, be emphasized that streptomycin is still in its experimental phase and its value in subacute bacterial endocarditis is still under investigation. Dramatic results have been achieved with the drug in a few cases which were resistant to penicillin. The most important limiting factor in this therapy seems to be the ability of many sensitive microorganisms to develop a resistance to the antibacterial effects of the drug.

Although some success has attended their use, it is now generally accepted that the anticoagulants such as heparin and dicoumarol are not only unnecessary, but because of the danger of hemorrhage, are contraindicated in the treatment of subacute bacterial endocarditis. Since the prognosis has improved so greatly, the risk of fatal hemorrhage occurring from what otherwise would be a relatively unimportant infarction of the brain or spleen is considered unjustifiable.

PROPHYLACTIC TREATMENT

Since it has been reasonably well established that most cases of subacute bacterial endocarditis occur following tooth extraction or dental manipulation, all patients who have valvular heart disease, either rheumatic or congenital, should receive prophylactic treatment with either sulfonamides or penicillin or preferably both, for a period of 48 hours before and for several days after extractions. A completely satisfactory prophylactic regime has not yet been proposed. Sulfadiazine can be given in doses of 4 to 6 grams daily either combined with penicillin or alone. Penicillin can be given in a dosage of from 200,000 units to 800,000 units per day, either in combination with sulfonamides or alone.

Opportunity to study the clinical course of subacute bacterial endocarditis under penicillin therapy presented itself shortly after penicillin became available, in two patients who subsequently recovered, have returned to normal activities and are still free from infection.

CASE REPORTS

Case 1: An electrician, 58 years of age, was admitted to the Philadelphia Osteopathic Hospital in extreme congestive heart failure, stuporous and unquestionably moribund, on September 13, 1944.

Approximately 2 weeks before admission to the hospital, he had had several carious teeth extracted. Following this dental work, he felt very well for 3 days, but suddenly on the fourth day experienced a chill and became so weak that he could move his arms and legs only with great effort. Within 48 hours he became dyspneic and pretibial edema appeared. There was no cough nor hemoptysis.

The patient's history, until the onset of the present illness, was negative. There was no recollection of rheumatic fever, chorea or tonsillitis. He vaguely believed he had had an attack of scarlet fever. The family history was positive for hypertension.

Physical examination on admission to the hospital revealed an orthopneic, jaundiced male with extreme dental caries. There were diffuse moist rales throughout both lungs which obliterated, until 2 days after admission, a systolic, apical murmur, transmitted to the axilla, and an aortic, systolic murmur. The liver was enlarged to 6 fingerbreadths below the right costal margin, and the spleen was enlarged to 3 fingerbreadths below the left costal margin. There was marked pretibial and sacral edema. There was no evidence of embolic phenomena.

The temperature was 101.4 F., respiration 50, and pulse 110. The blood pressure was 98 systolic and 58 diastolic.

The patient was placed in an oxygen tent and oxygen was administered at the rate of 7 liters a minute. Rapid digitalization was instituted and he was given 1 cc. of mercupurine intravenously. One hundred thousand units of penicillin was given intravenously followed by 25,000 units intramuscularly every 3 hours.

Laboratory results were as follows: hemoglobin 10 per cent; erythrocytes 550,000 and leukocytes 1,600 per cu. mm. with 71 per cent polymorphonuclear cells. The Schilling index was 22/47 and the multiple index was 8.2. The blood sedimentation rate was 42 mm. in 15 minutes. The urine was negative except for a one plus albumin. Blood culture taken on admission was negative.

Until blood could be secured, the patient was given fluids and blood plasma intravenously. Within the first 18 hours of hospitalization he received 1,500 cc. of whole blood. He was then given a transfusion of 500 cc. of whole blood every day for 7 days followed by 500 cc. every other day for another week. A total of 6,500 cc. of whole blood was administered

The response to initial therapy was encouraging; immediate improvement was apparent. Within a week the pretibial and sacral edema had markedly diminished. The liver and spleen decreased in size. The temperature, pulse and respiration reached normal limits within 5 days and remained so until the twenty-eighth day of hospitalization, at which time the temperature suddenly rose to 103 F. Blood culture taken at this time revealed a Staphylococcus albus in a nonhemolytic flora. The temperature receded to normal within 36 hours. On the forty-seventh day a blood culture revealed a Streptococcus viridans but there was no temperature rise at this time. On the sixty-sixth day of hospitalization, the patient experienced a sudden pain in the left hypochondriac area, which persisted for 48 hours and was accompanied by elevation in temperature for 2 days. This attack was attributed to a splenic embolus with infarction. Blood cultures were negative.

After admission, routine blood counts were performed every day for 10 days, and then approximately every 4 or 5 days. Within 2 weeks the hemoglobin rose from 10 to 75 per cent, the erythrocytes increased to 4,500,000 and the leukocytes to 6,200 per cu. mm. The Schilling index shifted to the right and the multiple index decreased to 1.7. The blood counts remained at satisfactory levels for the remaining time of hospitalization. Subsequent urinanalyses were negative. Periodic blood sedimentation rates gradually improved to 23 mm. in 60 minutes as compared to the initial drop of 42 mm. in 15 minutes.

X-ray examination of the chest 1 week after admission showed evidence of congestion in the lungs, and a cardiopathy. Left heart preponderance, aortic valvular disease in a regurgitant form and enlargement of the great vessel region were noted. The electrocardiograph revealed normal sinus rhythm, a partial A-V block and left axis deviation.

Initially, blood cultures were performed every day, and then every few days unless especially indicated. Only once was a Streptococcus viridans found. Several cultures were positive for Staphylococcus albus in a nonhemolytic flora. The great majority of cultures were sterile and remained so on 7 days of subculturing.

Subsequent therapy at various times during hospitalization consisted of ferrous sulphate, gr. 10 three times a day; pentnucleotides, 10 cc. intramuscularly three times a day and later once daily; yellow bone marrow glandules three times a day, and 1 cc. of reticulogen intramuscularly daily.

The remaining time of hospitalization was uneventful, except for the two marked elevations of temperature as noted above.

Penicillin was administered initially at 25,000 units every 3 hours, and at various intervals the dosage was decreased to 10,000 units every 3 hours, depending upon temperature. Three times before discharge penicillin was discontinued; twice the temperature immediately rose. The rise in temperature which occurred on the twenty-eigth day of hospitalization was during a period when penicillin had been discontinued. Penicillin was resumed at 25,000 units every 3 hours and the temperature returned to normal in 36 hours. Blood cultures were negative at that time. The attack of embolism to the spleen occurred following a 9 day interval of penicillin withdrawal.

Sulfapyridine and sulfamerazine were each administered for a period of a week, but no appreciable effects could be determined and the drugs were discontinued.

The patient was discharged on the eighty-eighth day of hospitalization, free of symptoms.

The total dosage of penicillin administered was 10,325,000 Oxford units and no toxic effects were observed.

Case 2.—An accountant, white male, 27 years of age, was admitted to the Philadelphia Osteopathic Hospital April 8, 1945, with recurrent fevers and chills. Two weeks before admission he had had several teeth extracted. At that time he was not ill but was suffering from a mild sinusitis. A few days after the extraction of the teeth he noticed frequent headaches, attacks of vertigo and a sensation of fullness in the epigastrium. He was treated at home for grippe, but obtained no relief. The day preceding admission to the hospital, he had experienced a chill followed by a fever of 104 F. He complained of profuse night sweats and had lost approximately 15 pounds in weight.

Physical examination revealed an adult, white male in no apparent distress. A loud, blowing machinery murmur (systolic and diastolic) was heard over the pulmonic area and was transmitted over the entire precordium. A thrill was detected over the second right interspace, and moist rales over the bases of both lungs.

Upon admission the temperature was 100 F., pulse 100 and respiration 28. The history was positive for rheumatic fever and pneumonia. The patient was not a blue baby and there was no recollection of cyanosis. The family history was negative.

Results of laboratory work were as follows: erythrocytes 4,800,00 and leukocytes 13,000 per cu. mm. with 76 per cent polymorphonuclear neutrophiles, of which 13 were stab cells. The multiple index was 3.2 and the Schilling index was 13/63. The hemoglobin was 87.6 per cent. The sedimentation rate was 23 mm. in 60 minutes. The initial blood culture was sterile. Sputum examination was negative for acid-fast bacilli, but revealed streptococci and some sarcinae. The quellung reaction was negative. The Huddleson agglutination test was negative in all dilutions.

X-ray examination of the chest revealed good pulmonary ventilation, with no evidence of tuberculosis. The heart showed slight left ventricular enlarge-

ment. The electrocardiograph revealed right axis deviation with high voltage of the QRS complexes in all leads, suggestive of congenital heart disease.

The temperature was of a septic type and varied between 99 and 103 F. throughout the first week of hospitalization, during which time the patient had no complaints. The initial order for penicillin was 25,000 Oxford units intramuscularly every 3 hours. On the eighth day he suffered a severe pain in the lower left chest which proved to be a basal pulmonary infarction. The temperature elevated to 102.6 F. but the blood culture remained sterile. The Schilling hemogram showed a shift to the left, and the sedimentation rate dropped to 29 mm. in 60 minutes. Penicillin was increased to 40,000 units intramuscularly every 3 hours.

Two weeks after admission, the temperature returned to normal and remained so for the duration of hospitalization.

Sulfamerazine, 1.0 gm. every 6 hours was given to the patient during the early phase of penicillin therapy, but had to be discontinued because of a drug rash.

The patient was discharged on the thirty-sixth day of hospitalization, free of symptoms.

The total dosage of penicillin administered was 5,600,000 Oxford units and no toxic symptoms were observed.

COMMENT

The importance of early diagnosis is illustrated by contrasting the total dosage of penicillin and the period of hospitalization in the two cases presented. The diagnosis was made late in the first case and relatively early in the second. Both cases occurred following dental extraction and might have been prevented by adequate prophylactic treatment. The first case indicates the hope of cure for most patients who have subacute bacterial endocarditis, regardless of how desperate the circumstances. The degree of residual functional damage to the heart in both cases was minimal and both patients returned to their previous occupations.

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PSYCHOSOMATIC MEDICINE

There has arisen in the world of medicine a new specialty, "psychosomatic medicine," a field of overlapping conditions that were previously a no man's land of diseases. Actually, it is a range of study that constitutes a "coming down" from technical dynamisms on the part of psychiatry and a "rising up" from organic materialism of internal medicine. It is a simplifying of psychiatry into terms understandable by the physician at large, and a shedding of light upon the mysteries of chronicity of 80 per cent of the average office practice. Flanders Dunbar[1] has made a monumental contribution to our knowledge and has laid the framework for the study of man as a psychobiologic unit. As in all new fields there is a contest for control, and the psychiatrist and the internist are engaging in a tug of war for its possession. Actually there should be no rivalry, but rather a cooperative association. Experience has shown that where the psychiatrist, internist and surgeon work together the patient benefits most.

An increasing number of articles are appearing in the literature dealing with psychosomatic conditions. Bennett,[2] for example, compared the difference in effectiveness between psychiatric treatment and medical care in a series of somatic problems. Dock,[3] looking at the matter from the internist's viewpoint, states frankly that in a large proportion of outspoken psychoneuroses an alert and experienced physician can effect just as good results with a minimum of effort as could be obtained by the most prolonged psychoanalytic or other specialized study. The answer is probably between these two extreme views. Osteopathy has contributed much in this field. It is a matter worthy of comment that the subject of backache, an elementary condition to most osteopathic practitioners, should receive so much discussion in the literature with virtually no mention of the contributions we have made. Sargent,[4] for example, has studied the problem from an emotional standpoint and described cases from his service in the Army, many of which are very familiar to most of us. Such cases are the boys who, failing to receive relief from the military medical services, have sought osteopathic help on the outside, and very often successfully so.

The value of osteopathic manipulative methods in psychosomatic conditions may stem from the relaxation it produces in the distribution of the autonomic nervous system. At any rate the results obtained are not dissimilar to those reported by Schmidhofer,[5] Sargent,[4] and others on the basis of their work with relaxation. Certainly there is much less complication in giving osteopathic corrective treatment. It is possible, too, that those cases mentioned by Dock,[3] resistant to psychotherapy, diet and drugs, might respond more satisfactorily to manipulative care than to sectioning of the vagi or thoracolumbar sympathetics.

There is need of a closer cooperation between the osteopathic physician and the psychiatrist. It would certainly work to a greater benefit to the patient if expert manipulative care were used for symptomatic control of nervous symptoms rather than the use of sedatives and hypnotics during the course of psychiatric reorientation. It is this cooperative teamwork that we as a profession have still to learn. It is not necessary for us to defend osteopathy, nor to spend time "selling" it. Our concern should be first the recovery of the patient, and when our prescriptions are nondrug and manipulative in nature they should be applied to solve a problem and not to prove the truth of a system. In this way the osteopathic physician contributes to a cooperative solution which, when reached, is neither to the total credit of the psychiatrist nor the osteopathic physician, but of both.

Whether psychosomatic affections are epidemic, as Halliday[6] suggests, or not, we have an overwhelming number of them on hand to be cared for, and with them there is a public consciousness of their true nature and an expectancy of some consideration of their dynamic nature. It is imperative that we be cognizant of this when we accept the responsibility of their treatment. There is also a public consciousness of the saneness of osteopathic methods, which is echoed in the groping by M.D. students. The study of Josey and Murphy[7] on the effects of ruptured intervertebral discs in the lower cervical and upper thoracic regions and associated angina pectoris-like syndromes is somewhat of an eye opener to allopaths. Their reaction is epitomized by the authors: "The question of why certain patients with ruptured cervical disks have precordial pain as the presenting symptom, or, in fact, why they have any precordial pain, cannot

1. Dunbar, F.: Psychosomatic diagnosis. Paul B. Hoeber, New York, 1943.
2. Bennett, A. E.: Faulty management of psychiatric syndromes simulating organic disease. J. Am. M. A. 130:1203-1208, April 27, 1946.
3. Dock, W.: Organic lesions resulting from emotional stress. Texas State J. Med. 41:398-401, Dec. 1945.
4. Sargent, M.: Psychosomatic backache. New England J. Med. 234:427-430, March 28, 1946.
5. Schmidhofer, E.: Therapeutic relaxation. J. Nerv. & Ment. Dis. 103:260-275, March 1946.
6. Halliday, J. M.: Epidemiology and the psychosomatic affections. Lancet 2:185-191, August 10, 1946.
7. Josey, A. I., and Murphy, F.: Ruptured intervertebral disk simulating angina pectoris. J. Am. M. A. 131:581-587, June 15, 1946.

be fully answered, and the route of the nervous pathway conducting the pain is not known." If one did not know about ruptured intervertebral disks these angina-like syndromes could very easily be grouped with the psychosomatic conditions. There is little doubt that osteopathic spinal lesions are responsible for many so-called functional illnesses. At any rate, osteopathic care along with psychiatric treatment offers the most effective solution available today in the field of psychosomatic medicine.

THOMAS J. MEYERS, D.O., F.A.C.N.

GAIN THROUGH EVALUATION

The profession may compliment itself upon the fact that its educational leaders do not fear to turn upon themselves the searching ray of self-appraisal. When the yardstick for such an analysis is Abraham Flexner's Survey of Medical Education in the United States and Canada, published in 1910, this study takes on added interest.

Mr. Morris Thompson, President of the Kirksville College of Osteopathy and Surgery, writing in this number of the JOURNAL, finally, after these many, years, indicates the valuable lessons that may be learned from that report to the Carnegie Foundation.

Perhaps much of the article is strong medicine for the osteopathic profession, but if we are to continue to build the school of osteopathic medicine on solid foundations, we must be brought to understand what such an undertaking really involves. Thompson's article leads to such an understanding.

Progress indicates motion forward. This article gives further emphasis to the Progress Fund and the timely reasons for meeting its important deadline.

If the profession can see the significance of our position among the healing arts professions, and grasp our present opportunity, we can answer in the affirmative the three fundamental questions that Thompson raises, and thereby further develop an approach to osteopathic education which will bring into full usefulness Still's basic concepts of maintaining health and combating diseases; and at the same time we shall prepare the graduates of our colleges for all the exacting duties which comprise the general practice of osteopathic medicine.

R. MCFARLANE TILLEY, D.O.

M. A. LANE IN PANCREATIC RESEARCH

November 14, 1946, marks the twenty-fifth anniversary of the announcement of the discovery of insulin by Banting and Best. On this date in 1921 they delivered, before the University of Toronto Physiological Journal Club, their first report on "Pancreatic Diabetes." While we give these investigators the credit and praise they deserve for the discovery they made, let us not overlook the research and discoveries of another pioneer in the field of pancreatic research. He was Michael A. Lane, discoverer of the alpha and beta cells of the islands of Langerhans in the pancreas.

In 1907, after 4 years of research at the University of Chicago, Lane's discoveries were reported in the *American Journal of Anatomy*, Philadelphia. These discoveries were among the bases for the research of Banting and Best. Wherever a note on the history of the discovery of insulin is recorded, there also is the name of Lane and mention of his contribution to pancreatic research.

Lane continued as a research worker and a medical college teacher and finally, in 1914, went to Kirksville to teach and to focus his attention on investigations based on the principles of the osteopathic school of healing. He continued there until his death in 1921.

At Kirksville, Lane, Professor of Pathology and Immunology in what was then the American School of Osteopathy, worked on the problem of increasing the antibody content of the blood by manipulation directed to the innervation of the spleen, and to the spleen itself. Some of his results were reported in the *Journal of Osteopathy* for December 1919 and June 1920. He was of the opinion that this research would lead to discoveries of greater moment than his finding of the alpha and beta cells in the pancreas, though when he passed on no one knew the relation of those cells to diabetes. Although Dr. Lane is named in nearly every book that deals with diabetes or with insulin, there is seldom mention of the fact that he later continued his investigations at a college of osteopathy, directing them to the solution of problems based upon the principles of osteopathy. It is nevertheless a fact, and an important one.

BETWEEN YOU AND YOU

Just between you and me—the Association's Home Building Fund is climbing steadily toward the goal. More than 2,000 members already have a share in it. It will be to your advantage and profit if it can be completed in time for the Chicago office to move in at the expiration of the current lease.

Just between you and you, this is a question of cooperation—a two-doctor job—to wind up the campaign in 1946. One doctor gives his time to invite the other to take part in the project and the other greets him cordially, listens, and makes his contribution. In the years to come both will feel proud of having helped to build this memorial to Dr. Andrew Taylor Still, which also will house the headquarters of the profession he founded.

Successful human undertakings are the result of teamwork. The solicitor has paid his share in cash. He's going on to contribute his time in addition. Perfect teamwork means that he is met halfway by a doctor who thanks him for the privilege of helping in this important forward step.

THEME FOR 1947 CONVENTION
"The Osteopathic Concept in the Healing Art"
Stevens Hotel, Chicago
July 21-25, 1947

SPECIAL ARTICLES

Educational Fundamentals in Osteopathy*

MORRIS THOMPSON, A.B.

President, Kirksville College of Osteopathy and Surgery
and the American Association of Osteopathic Colleges

Kirksville, Mo.

Before discussing general problems of osteopathic education, it is necessary to define certain terms which will be used, and to understand each other as to their meaning. I shall sometimes employ the term, osteopathic medicine, to describe the practice of osteopathy, giving it its full significance and value as a general system of medicine and yet differentiating it from the commonly accepted meaning of the word, medicine, which is associated with drugs, and from the school of practice whose members bear the degree, M.D. I shall use the term, medicine, in the general, classical and true meaning of the word, which is the art of preventing or curing diseases; the science which treats all disease in all its relations.

In addition to these definitions, it is necessary for me to set the stage with regard to my own viewpoint and my own frame of mind in approaching the subject. Accordingly, there are certain personal references which I hope you will excuse. First, I am a layman; second, I have depended upon osteopathy for the care of my health since I was 6 years old, when an osteopathic physician, by the use of manipulative osteopathy alone, saved me from death from pneumonia, where an M.D. had acknowledged defeat; third, I return to education from the business world, where facts are facts and figures are figures, and a man soon learns that he is wise to seek out, recognize and face the unpleasant facts as well as the pleasant ones and to give first attention to the former. Accordingly, in this analysis of the problems of osteopathic education I shall make certain statements which may seem to reflect discredit on cherished ideals, attitudes and personalities in osteopathy. It is not my intention to be a deliberate iconoclast nor to make light of the great contributions that have been made by osteopathic leaders of the past or of the remarkable progress that the osteopathic profession has made to date. I intend merely to take an inventory, which I hope will ignore all but true values and will help to chart our thinking for the present and future.

Formal osteopathic education had its beginning in the fall of 1892. The first college was incorporated by Dr. Andrew Taylor Still and members of his family so that his system of healing would be extended and perpetuated. In a description of the college, Dr. Still[1] said in part, "The object . . . is to establish a College of Osteopathy, the design of which is to improve our present system of surgery, obstetrics, and treatment of diseases generally and place the same on a more rational and scientific basis."

The school as established then and during the early years of the twentieth century provided facilities for instruction comparable to the average and superior to some of the other schools of medicine of the time. But it was naturally isolated from the spark of medical renaissance which had been brought to a few American institutions by the few men from this country who had studied in the great centers in Europe. This spark was fanned into a glowing blaze in the Johns Hopkins University School of Medicine and became the prairie fire of revolution and renaissance in the first and second decades of the current century. The fire was spread as the result of the work of the Carnegie Foundation for the Advancement of Teaching, through a survey of medical education in the United States and Canada conducted by Abraham Flexner in 1909 and 1910. The report of the survey was published by the Foundation in 1910 under the title, "Medical Education in the United States and Canada."[2]

I should like to quote a number of passages from that report and to recommend it for serious study by all who are directly interested in further solid development in osteopathic education. In announcing the purposes of the survey, Henry S. Pritchett,[3] then president of the Foundation, said, "Meanwhile the requirements of medical education have enormously increased. The fundamental sciences upon which medicine depends have been greatly extended. The laboratory has come to furnish alike to the physician and to the surgeon a new means for diagnosing and combating disease. The education of the medical practitioner under these changed conditions makes entirely different demands in respect to both preliminary and professional training."

In referring to the study of the various divisions of medicine, Pritchett[4] said further, "In making this study the schools of all medical sects have been included. It is clear that so long as a man is to practice medicine, the public is equally concerned in his right preparation for that profession, whatever he calls himself—allopath, homeopath, eclectic, osteopath, or whatnot. It is equally clear that he should be grounded in the fundamental sciences upon which medicine rests, whether he practices under one name or under another."

In describing the general purposes of the survey, Flexner[5] said, "The attitude of the Foundation is that all colleges and universities, whether supported by taxation or by private endowment, are in truth public service corporations and that the public is entitled to know the facts concerning their administration and development, whether those facts pertain to the financial or to the educational side. We believe, therefore, that in seeking to present an accurate and fair statement of the work and the facilities of the medical schools of this country, we are serving the best possible purpose which such an agency as the Foundation can serve; and, furthermore, that only by such publicity can the true interests of education and of the universities themselves be subserved. In such a reasonable publicity lies the hope for progress in medical education.

*Delivered at the Raton Convention of the New Mexico Association of Osteopathic Physicians and Surgeons, May 31, 1946.

Flexner,[5] referring to the problem of covering the various schools of thought in medicine, without particular reference to osteopathy, included all of the divisions which existed in that time, and said in part, "Once more, whatever the arbitrary peculiarity of the treatment to be followed, the student cannot be trained to recognize clinical conditions, to distinguish between different clinical conditions, or to follow out a line of treatment, except in the ways previously described in dealing with scientific medicine."

In his sections dealing specifically with osteopathy he made two statements which are worthy of complete quotation and serious ponder by all of us even at this date. Of course it must be recorded here that there is not an osteopathic physician nor an osteopathic educator today who is not fully in accord with the truths contained in the statements, and it must also be recorded that the fallacies which he said he observed in organization for teaching have, many of them, been corrected for many years, if in fact they were as he reported. The statements:

"Whatever his notions on the subject of treatment, the osteopath needs to be trained to recognize disease and to differentiate one disease from another quite as carefully as any other medical practitioner. Our account of the sect proceeds wholly from this point of view. Whether they use drugs or do not use them, whether some use them while others do not, does not affect this fundamental question. Whatever they do, they must know the body, in health and disease, before they can possibly know whether there is an occasion for osteopathic intervention, and if so, at what point, to what extent, etc. All physicians, summoned to see the sick, are confronted with precisely the same crisis: a body out of order. No matter to what remedial procedure they incline—medical, surgical, or manipulative—they must first ascertain what is the trouble. There is only one way to do that. The osteopaths admit it, when they teach physiology, pathology, chemistry, microscopy."[7]

"Nowhere is there the faintest effort to connect the 'laboratory teaching' with 'clinical osteopathy'; perhaps because no school has anything approaching the requisite clinical opportunities. Once more, their tenets are not in question. Much difference of opinion prevails among them as to whether they should teach everything or only some things; as to whether they may use drugs in certain conditions or must confine themselves wholly to manipulation for 'osteopathic lesions.' However this may be, the osteopath cannot learn his technique and when it is applicable, except through experience with ailing individuals."[8]

I think it is of historical import to repeat a sentence from the last quotation. "Once more their tenets are not in question." On more than one occasion in the course of the report Flexner disclaims any argument with the basic concepts of osteopathy. He does, however, concern himself with what he alleged were the lack of adequate organization and adequate facilities for the teaching of the osteopathic institutions of that time. The point should be carefully made that he was also just as severe and just as forceful in his attack on many of the so-called orthodox schools.

The impact of this report on orthodox traditional medical education in the United States and Canada was great. Commercial schools died like flies. The total number was cut to less than one half in a very few years. Those which did survive did so through the receipt of endowments from or through the influence of the Carnegie Foundation, Rockefeller Foundation and other great philanthropies or through more adequate tax support, in the case of the state university medical schools. It was discovered that proper medical education is an exceedingly costly process and that, since society has a stake in the origin and training of its physicians, society, either through philanthropy or through the state, must bear a substantial part of the bill for that training, since its cost is beyond the reach of the individual.

This is not to suggest that every surviving medical school became a perfect school over night. Even in 1925 Flexner in his book, "Medical Education," had reason still to note and deplore the slow evolution of American institutions toward the fundamental, classical values in good medical education. Nonetheless, progress was made. The commercial schools, with a few exceptions, were dead. The laboratory method was being adopted on a wider and wider scale. The medical school at Johns Hopkins was pioneering a full-time plan with some good influence on other institutions. The revolution was over; the renaissance was in full swing. But what of osteopathic education?

What was the impact of this sweeping revolution on a young, small school, at once proud but sensitive of its smallness, its newness and its unorthodoxy? It went immediately on the defensive. Because Flexner said bad things about osteopathic education, it was assumed that he was against osteopathy. Because parts of his report were bad, the whole thing was given the bad label. Osteopathy pulled into its defensive minority shell and went about its defensive minority way. Little time should be wasted on the discussion of historical "ifs." However, it may well be wondered what might have happened if some osteopathic leadership of the time had recognized the underlying values in Flexner's general study and had also identified the fact that he was no more severe with osteopathic education than he was with medical education in general.

Nevertheless, that was not the case, and we must trace the history of osteopathic education and development in the light of what actually happened. Osteopathy engaged in a race for numbers, sometimes at the expense of some educational standards. Commercialistic interest and control which disappeared so rapidly and to such a large extent from the general field of medical education remained dominant in osteopathic education.

Now we must examine one of the most significant phenomena of the whole history of medical development. This phenomenon centers around the fact that although osteopathic education continued in the pattern which led to destruction for the so-called orthodox institutions, in spite of these and other factors, osteopathy and most of its institutions survived. They not only survived, but they grew and prospered; they not only grew and prospered, but they produced a profession the vast majority in which did render, and have rendered, outstanding health service. The institutions not only survived and prospered and produced a worthwhile group of physicians, but they slowly, painfully, haltingly, reluctantly at times, but steadily, evolved toward a form of organization and a philosophy of operation in keeping with basic values in general medical education. The significance of this phenomenon should be examined objectively here for it points to many facts which can be helpful to the development of osteopathy now and in the future.

I have identified a number of reasons for the survival of the osteopathic institutions and the profession in the face of the denial of the educational revolution and the renaissance which followed in general medical education of the time. The first of these reasons may be attributed to the caliber of the majority of individuals who were attracted to osteopathy during that period.

For the most part they were of a vigorous pioneer stock, at least in terms of intellect, or they would not have answered the call of this buffeted minority school of thought in medicine regardless of its sublime logic or its therapeutic effectiveness. For the people of that time there was no attraction to osteopathy except its obvious truth and the opportunity it provided the individual to be of real human service.

Another factor in the survival of the profession and its institutions may be described as the minority psychology. History has proved time and again that a militant, cohesive minority can accomplish almost any purpose that it sets about. Certainly osteopathy of that early period demonstrated a militant and largely cohesive minority psychology. Associated with this reason is the fact of good organization with which osteopathy has been blessed both at the national level and in large part at the state level almost from the beginning.

Quite another phase of the minority psychology is the state of mind sometimes described as the osteopathic inferiority feeling. When this state of mind is truly an inferiority feeling, it is greatly to be deplored. However it is my observation, as a result of a careful study of the history of the profession and of the profession today, that this factor is more often manifested in ways which are wholly desirable and which certainly should be maintained, if possible, as a part of the professional psychology. These manifestations are many. First, and most important, is a consciousness on the part of the individual practitioner of the fact that he is a member of the minority school and, as such, is easily and constantly subject to scrutiny, and that he must therefore be right as often and as consistently as is humanly possible. This is resultant on the part of the individual practitioner in a caution and in a careful approach to practice which are certainly more to be desired in all schools of practice. The other important manifestation of this minority consciousness on the part of the osteopathic profession is found in organizational attention to postgraduate and refresher education on both required and voluntary bases to the point that the per cent of osteopathic physicians taking this type of work far exceeds the per cent of members of the dominant or so-called orthodox school who by this device keep themselves abreast of the ever-changing field of medicine so adequately described by Flexner:[9] "Medicine changes with startling rapidity; the student cannot be trained abreast of the times, still less launched on his professional practice as an actual learner or contributor, unless he studies under teachers who are active workers. The waters soon become stagnant unless continuously fed by fresh springs."

The final, most significant and dramatic reason for the survival of the osteopathic school, in spite of its early denial of basic fundamental truths instituted by the revolution in general medical education, and without which the other factors reviewed would not have been adequate for survival, lies in the powerful but simple fact that the new truth which Andrew Taylor Still brought to medicine is so sound, so good and so effective. It equipped its practitioners with a therapeutic tool so far superior to anything else of the time that the majority of them were, at that time, head and shoulders above practitioners of other schools—equipped, it is true, with superior education, trained in far superior institutions, but endowed with a limited, inhibited therapy.

Now, as Sigerist[10] points out: "The study of history is not a luxury. History is one of the most powerful driving forces in our life. Unlike animals, we are conscious of the past, and the picture we carry in us of our history determines our actions to a very large extent, whether we are aware of it or not."

Osteopathy as a profession could have engaged in this productive occupation more in the past and could do more of it today. The things which Flexner, through the Carnegie Report, brought to general medical education in the United States and Canada with a revolutionary impact were not new. Flexner did not even propose them as new. They were simply the assembling and organizing of truths which had been demonstrated by the effective organizational values in medical education through the centuries, and which at the time of Flexner's report were demonstrating their value by producing the great medical discoveries and the great medical scientists of the time, through their operation in the schools of central Europe. Further, the proper basis of medical education, as described by Flexner, is entirely without reference to or bearing on differential therapy. In other words, the organizational fundamentals described by the report on Medical Education in the United States and Canada are just as sound, just as valuable, just as effective for education in osteopathic medicine as for education in any other school of medicine.

Without reference to Flexner, an examination of the history of medicine and of medical education makes possible the identification of five factors in organization for medical education upon which a sound and solid program can be built. They have been found, all or in part, in many schools in many ages. They have no reference to therapy or to ideology in practice. They are timeless, schoolless fundamentals by which, in my opinion, a yardstick for measuring an institution for education in the healing art can be built. The degree to which these five fundamentals are operative in an institution will determine the value of the program of the institution. Those five fundamentals are:

(1) A nonprofit form of organization, in fact and in spirit as well as in legal provision.

(2) A recognition of the fact that society has a stake in the origin and training of its physicians, a stake which it must recognize by assuming the balance of the cost of good medical education over and above that portion which the individual may reasonably carry.

(3) The presence of opportunity for good advanced study.

(4) The presence of fundamental research.

(5) A program of full-time employment of teachers in both laboratory and clinical branches.

It takes little analysis to discover that these five factors are all interrelated. It is easy to see that a program of full-time employment, for instance, is essential to good fundamental research. If it is not easily concluded that the commercial theory of operation in medical education does not go with full-time employment, opportunities for advanced study and good research, I can certainly testify to you from my experiences that these things cannot be provided if an effort is made to balance the budget from the earnings of the institution, disregarding any effort to pay dividends or accumulate cash reserves from earnings.

The next significant demonstration of the fundamental nature of these values may be made as I have made it before by charging you to make any of your present or past criticisms of any of the osteopathic

educational institutions which I cannot trace back to the absence or weakness of one of these five fundamentals. For instance, it seems to me that one of the most consistent criticisms of some of the osteopathic institutions is the absence of good postgraduate work and of opportunities for training at the specialty level. This criticism can be assigned to number three with no hocus-pocus of translation.

Another of the more thoughtful criticisms of osteopathic institutions by the practitioner in the field is that not enough has been done to establish the "how" and the "why" of the therapeutic effectiveness of manipulative osteopathy and so to make possible its extension and its more effective use by the physician. Now this criticism sometimes is not directed point-blank at the educational institution but arises out of a vague dissatisfaction on the part of the doctor. I can assure you that it should be aimed at the educational institutions, for there and only there can that kind of research be done which like some work now happily in process in my own institution and in some of the others, will give promise of a better understanding of the effectiveness of osteopathy. Again, I can assure you that this research certainly is dependent on a non-profit form of organization and full-time employment of teachers, for research is expensive. Its product cannot be turned through the cash register and, for the most part, it must be done by men whose whole lives are given to teaching in all of its ramifications which include research and practice, as well as the more common understanding of teaching which involves the didactic classroom lecture.

The thing which has given osteopathy much of its vitality through its historically short existence to date has been the far-reaching newness of the thought which Still propounded and upon which the school is based. However, far too much of the teaching in its institutions from that time to this has been concerned with the parroting of Still's thoughts and of the knowledge developed by others in other schools. The original spark of exploration given by Still, like many other sparks of knowledge, will die unless fanned and fed by further additions to that knowledge. Gregg[11] speaks of the value of research to a teaching program in this way: "Another important bearing of research is its refreshing effect upon teaching. So valuable and so intimate is this relationship that it has been the subject of unnumbered essays, and the working principle in many an educational reform."

Another of the frequent criticisms of the osteopathic institutions by men in the field has been that of the preoccupation of the teachers with private practice and all of the ill effects which that preoccupation can have on the educational program. Certainly the answer to that criticism is found in the last, and to me the most important, of the five fundamentals—that of full-time employment of teachers in both the clinical and laboratory branches.

The process of tracing back your criticisms to these five fundamentals could continue indefinitely. However, there is another set of tests which they must undergo before they can be accepted entirely. Those tests represent the questions of the educator concerned with the topical or surface manifestations of a teaching program. He will say, "But what of curriculum? You make no mention of this all-important device in your discussions of educational fundamentals." I will say to you, get your full-time men, set the stage for their work with the presence of the other four fundamentals, and you will have a curriculum. As a matter of fact, to the limit of its value to the institution, good men will insist on a good curriculum. In the Kirksville College an earnest committee of five men has met at least one night a week for 18 months wrestling with this problem, in spite of the fact that they know, as Wilbur[12] has said: "I once said that changing an established curriculum was as difficult as moving a cemetery. It still is."

Back to Flexner[13] to have it said another way: "A good teacher of physiology, a sound teacher of medicine or surgery, would spurn the mechanical correlations of a set curriculum; each of them would, however 'correlate,' 'associate,' 'recall' at every breath —and, best of all, stimulate to further inquiry, reading, or investigation on the student's part; but no two would perform the trick in the same way, as is the assumption and purpose of those who work out plans of correlation meant to guide the instructor and to shepherd the student."

Of course the next criticism of the topical educator will be the problem of assuring that you really do have good men. He may contend that full time is no guarantee of quality or he may say, as some have said, that full-time institutional appointments separate a man from the "practical" aspects of practice which are so important for students to have and which will be brought by the part-time man. This must be answered in two ways. Not all individuals who accept full-time appointments in a medical college are uniformly good. However, there is a quality in the motivation of the individual who will forsake the earning opportunity in private practice or in private industry, which almost universally assures the institution that that man will do a good job. It does not mean that he will bring to the full-time job the fullest accomplishment or the fullest skills, but it does mean that he will have an interest and a motivation which will lead him to acquire the knowledge and the skill necessary for him to do an ever better job. An occasional individual will seek refuge from the realities of life in full-time institutional employment. That individual soon finds, however, that the so-called hard realities of competitive life are kindly compared to the isolation accorded the inept by a group of hard-working, earnest men and women who are making a sacrifice for a good purpose and who see the refugee from reality as a millstone around the neck of their mutual endeavor. Further, it has been rightly said that there is no more severe critic than the undergraduate student. Undergraduate groups and individuals find ways of expressing their lack of respect for an inept teacher that are not always kind, but are always manifest.

Answering the criticism that the full-time clinician is separated from the practical aspects of private practice is easy, if you but consider that the full-time clinician is not relieved of the responsibility of seeing, diagnosing and treating patients or, in some instances, even of assessing fees to be paid by the patient to the institution. The great value of the full-time appointment comes from the fact that the men need not concern themselves with keeping life together from the proceeds of a practice and that they can give full attenion to any and all patients they choose regardless of their ability to pay.

Said another way by Flexner,[14] it is just this: "Meanwhile, no limitation whatsoever is placed upon the instructor's freedom to see and treat patients inside

or outside the hospital in order to gain experience or to render service—a provision of great importance often, however, overlooked by critics of the full-time system; he is simply freed from the necessity of earning any part of his livelihood by private or consulting practice—free, that is, to devote himself in what is for him the most effective fashion to the care of patients, the training of his pupils and the increase of knowledge."

While this particular organization of these particular fundamentals may be original with this writer in osteopathy, the profession has been blessed with a group of leaders who have been aware of the need of classical values in medical education for many years. By and large, this awareness has been exercised through the activities of the Bureau of Professional Education and Colleges of the American Osteopathic Association, which slowly but rather surely has worked toward increased standards through the years. Another group of leaders not so much concerned with or interested in the actual details of good education has been progressively more aware of the fact that good professional legislation is supported in the final analysis by only one thing, namely, good and ever better professional education.

The combination of the interest and convictions of these two groups has led to a series of related conclusions. First, the profession has discovered that the right kind of professional education is an extremely costly process. It has also discovered that professional progress is impossible without educational progress, and that good legislation is impossible without both. Since good legislation is to be desired, good education is also much to be desired, and since it is a costly process, and since the colleges do not have tax support, the osteopathic profession must pay for the good education which it requires. The profession has discovered that the educator who boasts about cash balance has sold his institution and his profession short, while the educator who speaks of deficits and budget funding likely is doing a good job.

As a result of that discovery the osteopathic profession has, during the past 2 years, subscribed over a million dollars to its educational institutions. While that is a good start for a profession just learning these truths, in the long run it has accomplished only two things toward the problem at hand. First, it has taught the osteopathic profession that it can give and raise money; and second, it has given the colleges just enough money for them to make a start on the kind of program which they must prosecute during the years to come; and to demonstrate to themselves, to the profession, and to society that they can spend to the benefit of the profession and of society.

The result of these various developments has raised three fundamental questions, which the profession must face squarely now and answer finally and courageously.

These three questions are:

First, we have required the educational institutions to expand and improve to the point that their program now requires substantial sums of outside money each year; will we give or get the money necessary for them to continue that type of program?

The second question is related and is equally significant. The standards of operation which have been instituted in our educational institutions are of the type which preclude any semblance of mass production. The very people whom we have introduced into our colleges to raise their standards will not compromise their own personal standards to accommodate quantity production of physicians. Therefore, shall we fight the battle of quantity or the battle of quality?

The third of the fundamental questions raised by the situation has been frequently posed, and it goes something like this: Having accelerated our standards to approximate and, in some cases to exceed, the standards of the orthodox or dominant school of medicine, will we be able to continue the teaching of fundamental manipulative osteopathy, and will the products of our school be interested in practicing manipulative osteopathy?

I should like to discuss these three questions separately. The first one: Will the profession give or get money necessary for its colleges to continue the expanded and improved, but exceedingly expensive, program of professional education? There is only one answer which goes with survival. The answer is a sincere, immediate, demonstrated and generous "Yes!" Many of the colleges have recently increased their clinical earnings, and have improved their methods of operation. They will, some day, get endowments, grants, and governmental assistance, all of which will help in offsetting increased expense. However, never will the profession as a group or as individuals be relieved of the responsibility of contributing generously, personally, to osteopathic education or of seeing that their grateful patients do likewise. To me it is a desirable thing that there is this interdependence between the profession and the colleges. It will keep the colleges accountable to the profession and the profession vitally interested in the colleges.

The answer to the second question should also be fairly easy. Shall we fight the battle of quantity or the battle of quality? History will probably some day record that the quantity production of osteopathic physicians during a certain period was desirable or, at least excusable, especially when it is considered that this production was accomplished in part during a period when physicians of other schools were produced under conditions no more desirable. However, the day when that can be accomplished safely and with even comparative justice is past. The only possible answer in these days is the battle of quality. The dominant school with an educational plant of some 70 institutions compared with the 6 osteopathic institutions; and with a total membership of 175,000, compared with 11,000, has the battle of numbers won. It had that battle won in the beginning and will keep it won. In the battle of quality it is always floundering, however. It floundered in a helpless, directionless way when Still rebelled and brought forth a system of logic in healing. It flounders today, having accepted most of the differential philosophy which Still announced, but knowing little of the method which goes to make that philosophy effective for humanity. Since the osteopathic profession has the battle of quality won, in terms of medical armamentarium, it must reinforce that victory in terms of selection of individuals and in terms of their training. Professional legislative philosophy, wherever built on the hopeless battle of numbers, must be reorganized on the basis of quality of individuals and quality of the service which the individual renders.

Finally, will we be able to teach fundamental manipulative osteopathy and insure that the product of our school will practice it? The answer to this, again, is yes. Full-time teachers, both in the clinical and in

the laboratory or basic science branches, are not content to give their lives to a minority school unless that minority school is true to the reasons for its separate existence. Adequate staffs of full-time teachers, adequately paid, can teach manipulative medicine. They are not content to do otherwise. It must be so well taught, however, in combination with other modalities, and its superiority so effectually demonstrated clinically, that the choice of the intelligent student will be the logical choice of using the best that he knows, rather than the only thing he has been taught. The careful selection of students of high caliber qualified to enter any school of practice will assure a vast majority of students who enter osteopathy by choice. Having done that, those students will not only accept basic manipulative osteopathy but will demand it and will demand that it be better taught. And if it is better taught, they will practice it by choice in every case possible, because it is better for the patient and better for them.

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The Evanston (Ill.) Township High School Guidance Program

LAWRENCE W. MILLS, M.A.

Vocational Director, American Osteopathic Association

Chicago

The Evanston (Ill.) Township High School is one of the most beautiful in the country. Nearly 3600 students are fortunate in having the opportunity of acquiring their fundamental training in this huge Romanesque type building. Unlike many of the high schools in the country, the Evanston High School is not overcrowded and, although the enrollment is huge, every student has an opportunity for careful guidance, not only in his high school courses, but also for possible occupations after his high school training.

Mr. Paul A. Young, Director of Guidance and Research for the Evanston Public Schools, is in charge of the complete guidance service, which is the most comprehensive that the writer ever has seen in a high school or university. Mr. Young is the past president both of the Iowa and of the Illinois Guidance Associations, and has held several important offices in the National Vocational Guidance Association. Having had 23 years in school administration, as well as an active career in vocational guidance and counseling, Mr. Young has been outstandingly successful during the past 4 years in building up a nationally known guidance program in the Evanston Township High School.

This program is unique and so comprehensive that the high school received national recognition in the summer of 1946, when Mr. Young was called to Washington to explain his program to the officials of the American Council on Education. Mr. Young has been commissioned by the Council to write three books on the Evanston program, which will be widely distributed to superintendents of public schools in the United States by the Council. A day rarely passes without high school or university educators, who have travelled from all parts of the country, visiting the Evanston public schools, to see how effective and how valuable a guidance program can be.

During the freshman and sophomore years the students are given an effective orientation program concerning study habits, general occupational fields and the importance of personality development. In the start of the junior year students are eligible to join "career clubs." At the present there are 46 career clubs in existence in this high school, ranging from accounting and aeronautics to osteopathy and teaching. Each one of the career clubs meets from 4 to 6 times during the school year in the early evening, so adult leaders will be available. As far as possible it is planned that the clubs meet where the occupation takes place or at places where educational training can be secured. Parents of the students are always welcome as listeners and returning service men are invited to attend club meetings.

The osteopathic profession will be interested to know that Dr. D. D. Waitley, who is the vocational chairman of the Kiwanis Club in Evanston, is an active adviser of the osteopathic club in the high school program. Mr. Young paid Dr. Waitley a high compliment when he said that Dr. Waitley was most active and interested in seeing to it that the students, who have expressed an interest in osteopathy, are given not only the advantages but also the disadvantages to be found in the osteopathic profession. Last spring Dr. Waitley spoke to a large number of students interested in the various fields of the healing professions.

Membership in the many career clubs is entirely voluntary. Last year over 800 juniors and seniors took advantage of these clubs to discover for themselves the qualifications, academic and personal, which are required by certain occupations and also the specific type of work that they would be required to perform in particular occupational fields. The students are encouraged to join at least three career clubs. When a student shows an interest in a particular occupation, he must have more than simply an interest in that occupation.

From the first year on various psychological and aptitude tests are given to each student. His intelligence quotient is determined and various tests are administered to determine his basic skills in mathematics, language, reading comprehension, reading vocabulary and mathematical reasoning. Various tests are administered to determine scholastic and scientific aptitudes, and aptitudes in art and music, business, mechanical and industrial fields. The student and his parents are carefully advised on the basis of this comprehensive testing program, and the actual results which he has shown in his high school work, whether or not he would be successful in the training for a certain occupation or the occupation itself. The student's personality is also carefully analyzed and a close check is scientifically made concerning personality factors which should be improved.

A complete scientific summary of guidance records, test ratings, scholastic records and personality appraisals are maintained in Mr. Young's office.

A student may inform Mr. Young that he is interested in joining the osteopathic career club. He may have been interested in becoming an osteopathic physician from early childhood. Perhaps his parents had told him from early infancy that he was going to become a doctor. The guidance records, however, might show that this particular student is far below average in scholastic aptitude and not at all interested in academic work. On the other hand, the various testing programs, his achievement record in certain courses in the high school and the opinions of his teachers might indicate that he would be far more capable in the general mechanical field. How fortunate that young person is to be advised before the completion of his high school course that he quite likely would be a failure in a premedical college course but undoubtedly would be outstanding in the machine design field. Mr. Young described to the writer a number of similar cases.

If, on the other hand, the student shows that his interest in the osteopathic field is backed up by a good scholastic and achievement record and gives promise of being successful in the training required to be an osteopathic physician, he then is permitted to join the osteopathic career club. It may be that he has certain personality factors which should improve if he plans to become a doctor. This information is given to his personnel director. The Evanston High School, incidentally, has organized its students in groups of 250 with a sub-principal in charge of each group. The sub-principal is notified by Mr. Young of personality traits in the student which should be developed. The student and his parents are told of the importance of developing certain traits. When this fortunate boy or girl graduates, a complete record is sent to the preprofessional college which he or she plans to enter. Over fifty colleges and universities in the country thus far have received these comprehensive reports on entering students from the Evanston Township High School, and have praised the high school for the detailed picture which has been so carefully put together by Mr. Young and his staff.

The Evanston Township High School is congratulated in taking the leadership among the country's school systems in a program which will do much to eliminate misfits from the various occupations and, therefore, will reduce automatically the large number of unhappy individuals in adult life. The osteopathic profession is proud of the fact that one of its members, Dr. D. D. Waitley, has made himself an important cog in this modern guidance program.

The vocational guidance program of the osteopathic profession is based on the cooperation between individual members of the profession and the professional counselors in our educational systems. Our profession needs many more physicians who will agree to offer their services in our vocational guidance effort, not only to insure the profession that the young people joining it will become successful and happy osteopathic physicians, but also to assist in their local high school or college guidance program.

Your vocational guidance director has been informed by leading officials of the National Vocational Guidance Association that the American Osteopathic Association is the first professional headquarters to initiate a vocational guidance program. It is up to the members of the profession to make this program a successful one.

139 N. Clark Street

QUO VADIS (An Editorial)

The chief difference between our problems of today and those of 1865 are that our population is greater and our ethical opponents are more firmly entrenched behind a barrage of public propaganda, well financed and well organized. However, our great opportunity lies in the fact that the public is fed up with medical propaganda. They see clearly through the selfishness of medical regimentation, and are thoroughly familiar with economic impediment placed on medical teaching and medical practice. On the other hand, it is very remarkable that the medical regimenters are so ignorant of the attitude of the public that they will continue to carry on the propaganda for further regimentation.—John C. Hubbard, M.D., *The National Eclectic Medical Quarterly*, March 1946.

RESEARCH A UNIVERSITY FUNCTION

Colleges and universities are the training schools of researchers and are the source of the available research personnel. They are the home of research and, although much research has been transplanted to industry and to endowed research institutes, these must always look to the universities for their trained investigators and their research directors.—Carl G. Hartman, *Science*, April 26, 1946.

LINEAR SKULL FRACTURE

A simple linear or diastatic fracture of the skull which crosses one of the main dural sinuses is frequently followed by impairment of venous outflow from the brain. Such passive congestion is marked by increased intracranial pressure with headache, choked discs and, occasionally, the persistence of mental confusion. The prompt recognition of the condition . . . permits recovery under conservative management with special reference to upright posture. Anxiety is minimized and unnecessary surgical intervention, such as ventriculography or burr-hole exploration, is avoided.—Arthur D. Ecker, M.D., *New York State Journal of Medicine*, May 15, 1946.

Department of Professional Affairs

B. F. ADAMS
Chairman
West Hartford, Conn.

BUREAU OF PROFESSIONAL EDUCATION AND COLLEGES

R. McFARLANE TILLEY, D.O.
Chairman
Brooklyn, N. Y.

NEW DEAN AT THE CHICAGO COLLEGE

Dr. Walter C. Eldrett has been named Dean of the Chicago College of Osteopathy. Dr. Eldrett graduated at the Chicago College in 1927, interned at the Chicago Osteopathic Hospital in 1928 and has practiced at Carthage, Illinois, since 1930. For 11 years he was president of the Carthage Board of Education.

COMMITTEE ON SPECIAL MEMBERSHIP EFFORT

STEPHEN B. GIBBS, D.O.
Coral Gables, Florida
Chairman

YOU CAN HELP IN MANY WAYS

One out of every eight of you who are reading this report has, as yet, neglected to pay his current 1946-47 A.O.A. dues. If you are one of those we are speaking of, stop now and send your check immediately. You can save the Central office a lot of unnecessary work and expense. Don't allow yourself to be a monkey wrench in our progress machinery.

Every month for the past 4 years, with one exception each year, our A.O.A. membership has shown an increase over the preceding month. That exception is in January. Each year many careless members are dropped from membership on January 1, because their A.O.A. dues are not paid up to that time. A lot of hard work is needed for several months to recover that loss and still be able to show an annual increase in membership by June 1, which is the start of each fiscal year. Let us not have that loss repeated this year on January 1. None of us wants it to occur again. Your check book holds the solution to the problem.

In a letter to nonmembers, dated September 18, 1946, Dr. Robert B. Thomas, our President-Elect, states: "Your national Association is the agency which is recognized by governmental authorities as the organization with which they must advise on problems which concern the osteopathic profession in the field of public health and social medicine. Such contacts are increasingly frequent. Your membership in this organization adds to its potential strength in handling such matters.

"It is easy, when one thinks about it, to realize that membership in the A.O.A. not only is a great honor to the member but is also his first line of protection against infringement on his rights to practice his profession." He certainly knows what he is talking about.

Our problems are piling up more and more every year. The support of 10,000 members is needed now much more than that of 4,000 members was needed 10 or 20 years ago. Our recognition by the U. S. Congress and our practice rights are at an all-time high but it requires that much more work to protect what we have gained.

In order to maintain the high educational standards required of our graduates by our state laws, our colleges have been subjected to a tremendous expense. The tuition fees from our present enrollment of students cannot possibly maintain the college expenses. They must be obtained elsewhere. Even though you are not financially able to make large donations to the Osteopathic Progress Fund and the Permanent Home Fund, your continued support as a member can be a great help. The Association is put to considerable expense organizing these fund-raising campaigns. You, as a part of the O. P. F. committee (you are considered as such) to solicit funds, can do a far better job as a member than you can as a nonmember. The public is not going to help us unless we are organized ourselves. As an Association member you can render valuable assistance to the very important vocational guidance program.

The American Osteopathic Association and our colleges need 100 per cent support from our entire profession.

1. Pay your dues immediately.
2. Help the vocational guidance program and encourage ambitious young men and women of excellent character to study osteopathy.
3. Give liberally to the Osteopathic Progress Fund so that our colleges can be equipped properly to increase their efficiency and educate more students to enter the field of osteopathy.
4. Give what is asked of you to the Permanent Home Fund.
5. Encourage nonmembers of your acquaintance to become members and remain members indefinitely; and above all, never relinquish your A.O.A. membership!

8,300 by July 1, 1947.

S. B. G

ADVISORY BOARD FOR OSTEOPATHIC SPECIALISTS

LOUIS C. CHANDLER, D.O.
President of Executive Committee
Los Angeles

ADVISORY BOARD PERSONNEL 1946-47

The Executive Committee of the Advisory Board for Osteopathic Specialists is composed of: Chairman, Louis C. Chandler; Vice Chairman, J. Paul Leonard; Secretary-Treasurer, resigned; members-at-large, S. V. Robuck and C. A. Tedrick.

Representatives of organizations of the American Osteopathic Association on the Advisory Board are as follows: Board of Trustees of the A.O.A., C. Haddon Soden and Allan A. Eggleston; Bureau of Professional Education and Colleges, R. McFarlane Tilley and C. Robert Starks; Bureau of Hospitals, Floyd F. Peckham and J. Paul Leonard; American Association of Osteopathic Colleges, Edward T. Abbott and A. C. Hardy; American Osteopathic Hospital Association, Harold E. Clybourne and R. R. Daniels; American Association of Osteopathic Examiners, Samuel F. Sparks and Glen D. Cayler; National Board of Examiners for Osteopathic Physicians and Surgeons, S. V. Robuck and John E. Rogers; American Osteopathic Board of Internal Medicine, L. B. O'Meara and Frank R. Spencer; American Osteopathic Board of Dermatology and Syphilology, R. W. MacCorkell and Cecil D. Underwood; American Osteopathic Board of Neurology and Psychiatry, G. N. Gillum and Thomas J. Meyers; American Osteopathic Board of Obstetrics and Gynecology, Homer R. Sprague and R. B. Bachman; American Osteopathic Board of Ophthalmology and Otolaryngology, T. J. Ruddy and C. Paul Snyder; American Osteopathic Board of Pathology, Otterbein Dressler and William J. Loos; American Osteopathic Board of Pediatrics, William S. Spaeth and Dorothy Connet; American Osteopathic Board of Proctology, Frank D. Stanton and Mabel Andersen; American Osteopathic Board of Radiology, C. A. Tedrick and Paul T. Lloyd; American Osteopathic Board of Surgery, J. Gordon Epperson and J. Gordon Hatfield.

AMERICAN OSTEOPATHIC BOARD OF SURGERY

The American Osteopathic Board of Surgery is now composed as follows: Chairman, J. Gordon Hatfield; vice chairman, Richard A. Sheppard; secretary-treasurer, Orel F. Martin; members, Earl Laughlin Jr., Edward T. Abbott, John P. Schwartz, L. B. Faires, James M. Eaton, J. Gordon Epperson; representatives on the Advisory Board of Osteopathic Specialists, Orel F. Martin, J. Gordon Hatfield.

Dr. Orel F. Martin, secretary of the Board, has removed to P. O. 263, Coral Gables, Florida.

Department of Public Relations

CHESTER D. SWOPE, D.O.
Chairman
Washington, D. C.

WAR DEPARTMENT ISSUES OCCUPATION BRIEF IN OSTEOPATHY

The War Department has issued Occupational Brief No. 105 entitled "The Job of the Osteopathic Physician," available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C. at 5 cents for a single copy.

The American Osteopathic Association cooperated in the preparation of the brief for the education programs of the Armed Forces. It is one of a series of occupational briefs issued by the War Department as an aid in selecting an occupation. Other briefs in the series include "The Job of the Chemist," "The Job of the Dentist," "The Job of the Physician," "The Job of the Physicist," et cetera.

Osteopathic physicians are often called upon by members of the Armed Forces and veterans for information on preparation for, and opportunities in, osteopathy as a career. The complete text of Occupational Brief No. 105 reads as follows:

THE JOB OF THE OSTEOPATHIC PHYSICIAN
(0-39.96)[1]

What Do Osteopathic Physicians Do? Osteopathy is the art and science of prevention, diagnosis, and treatment of disease and injury which places major emphasis on manipulation (with the hands) and includes surgery and the other branches of the healing art. Osteopathic physicians employ manipulative methods to detect (by sense of touch) and to correct (by adjustment) maladjustments of, or affecting, the bones, muscles, blood vessels, nerves, and other tissues which are recognized as factors in physical and mental functions and disease. The use of osteopathic manipulation is based on the principles that (1) faulty body mechanics disturb bodily functions; (2) the tendency of the normal living body is to make its own remedies against infections and other toxic agents; and (3) the production and distribution of such remedies are aided by proper manipulative procedures to correct faulty body mechanics. The usual techniques of medical science, such as surgery, obstetrics, physical therapy, drugs, and medicines are also embraced in osteopathy.

An osteopathic physician and surgeon must know how human bodies are built and how they work; how to keep people well; and how to restore them to health. He must be familiar with the kinds and causes of human disease, surgical diagnoses and procedures, foods, and drugs and biological products. He must understand hygiene and sanitation as they affect people's minds and bodies, including food and water supplies, heating, lighting, ventilation, and other conditions at home and school and in places of employment and amusement.

The osteopathic physician and surgeon uses various mechanical helps in the physical examination and treatment of patients, including an osteopathic treatment table, X-ray machine, blood-pressure machine, microscope, stethoscope, surgical instruments, and electrical apparatus common in the practice of physiotherapy. The doctor does not confine his study of a patient to a history and a physical examination. He maintains his own laboratory in which he examines blood, diseased tissue, and the excretions and secretions of the body, or else he refers such work to established diagnostic laboratories. Often after a preliminary diagnosis he refers a patient to a specialist for treatment.

Most osteopathic physicians as legally qualified in varying degree in the various States engage in general practice, but an increasing number specialize. The specialist is concerned particularly with certain groups in the population, or with certain types of disease, or with certain techniques. Following is a list of most of the osteopathic specialists:

Gynecologists and obstetricians, dealing with women's diseases, pregnancy, and childbirth.

Pediatricians, dealing with the health and diseases of infants and children.

Internists, dealing with the diagnosis and nonsurgical management of diseases of the internal organs, including the respiratory, circulatory, digestive, metabolic, endocrine, and other systems, excluding diseases of the nervous system, reproductive apparatus, and organs of special sense.

Neurologists and psychiatrists, dealing with diseases of the nervous system and of the mind.

Ophthalmologists and otorinolaryngologists, dealing with diseases of the eye, ear, nose, and throat.

Proctologists, dealing with diseases of the terminal portion of the digestive tract.

Pathologists, dealing with the laboratory study of disease by means of the microscope, etc.

Radiologists, dealing with the use of the X-ray and radium.

Surgeons, dealing with diseases and injuries calling for surgical treatment, instrumental and bloodless. There are specialists within the surgical specialty, including anesthesiology, orthopedics, and urology.

The osteopathic physician may engage in various occupational functions: He is eligible to serve as an officer for the United States Public Health Service, or he may serve as health officer for a State, city, or county. He may serve as an administrator for an osteopathic hospital, clinic, osteopathic college, or osteopathic organization. Some osteopathic physicians teach in an osteopathic college or engage in public educational work. Others write for or edit scientific books or journals. A number supervise the production of biological products.

How Do You Qualify as an Osteopathic Physician? To become an osteopathic physician and surgeon you begin with a study of the sciences in high school, following which you study at least 2 years in an accredited college of arts and sciences, 4 years in an approved college of osteopathy, and in many cases at least 1 year as an intern in an approved osteopathic hospital. Osteopathic colleges and hospitals are approved by the American Osteopathic Association. Then you must pass an examination and secure a license from a State examining board. Osteopathic physicians are licensed to practice manipulation in all of the States. They are licensed to practice surgery and use drugs without limitation in some States and with various limitations in other States, according to State licensing laws. Information about training and license requirements for the State in which you plan to practice should be obtained from the State examining board or from a local osteopathic physician. As a newly graduated osteopathic physician and surgeon you may open up a new practice of your own, may become assistant to or associated with an established physician, may buy a practice, or may secure an appointment in an osteopathic hospital or other institution.

Who Should or Should Not Become an Osteopathic Physician? The osteopathic physician combines the aptitudes of a scientist, a social leader, and a skilled manipulator. You must have an aptitude for mastering such college subjects as biology, physics, and chemistry. You need a retentive memory for innumerable facts such as relate to the composition of the body, injuries and diseases, and medicines; keen senses of sight, hearing, smell and touch to detect the physical signs of disease or injury; and strong powers of reasoning to figure out what these signs mean in terms of specific disease or injury. You must have a strong desire to stick to facts and to discover their causes. You should like to meet people, to listen with sympathy to the details of their ailments and worries, and to give advice to people. You need courage to advocate and practice principles of healing

[1]Dictionary of Occupational Titles code number.

that are not as yet universally accepted; and a strong enough personality and conviction of the value of healing sciences to influence the thoughts and feeling of sick people.

In order to "feel" and adjust faulty structures in the body, you need sensitive, strong fingers and strong wrists. You should have enough health and strength to withstand irregular hours, infection from contagious diseases, and the physical work of manipulation. If you cannot master feelings of nausea or disgust at the sight of blood or diseased tissue, you should think twice before taking up osteopathy.

If you served as a Medical Technician, Surgical Technician, Practical-Male Nurse, First-Aid Man, Medical Aidman, Medical NCO, or Pharmacist's Mate and found the work interesting, you may like the work of an osteopathic physician. Some of the tests which you have taken in the service may supply additional information about your occupational aptitudes. But only a person who is trained to interpret tests can tell whether your test scores show that you have any special abilities for a given occupation.

Where Do Osteopathic Physicians Work, What Do They Earn and What Is the Outlook? The larger per cent of all osteopathic physicians and surgeons in the United States are in private practice. Some are with private osteopathic hospitals and with a few but increasing number of public hospitals. Others are with clinics, public health services, medical departments in colleges, industrial organizations, athletic aggregations, research institutions, and osteopathic colleges.

Earnings depend upon the individual ability of the physician and the economic status of his patients. It is commonly thought that the income of the specialist is always greater than that of the general practitioner. But many of the latter, by study and application, have built highly remunerative practicies. In New York State in 1941, the average gross income for osteopathic physicians was $5,680 a year in localities having a population less than 10,000; and was $7,500 in localities having a population over 100,000. In New York City the average gross income was $10,738. Physicians in rural areas usually received less than those in cities; however, living costs are lower in rural areas.

There are nearly 11,000 osteopathic physicians and surgeons in the United States. Many more are needed to care for the health needs of those who already use the services of osteopathic physicians. In addition, the number of persons desiring such care is constantly increasing. The number of doctors of all schools has never been sufficient to care for the health of all the people who needed a doctor's attention. With economic changes and an increase in health- and hospital-care plans, the ability of the average person to afford such attention promises to increase; so that for a long time the supply of doctors is likely to be inadequate. This is particularly true in the osteopathic field. Opportunities will be good for decades to come in rural areas, in group medicine, in public health, in industrial and athletic organizations, and elsewhere.

Where Can You Prepare To Be an Osteopathic Physician, and What Subjects Do You Take? You may prepare to serve as an osteopathic physician and surgeon by first studying high school chemistry, physics, biology or general science, algebra, and geometry. The preosteopathic course in an accredited college includes such subjects as college algebra, zoology, botany, inorganic chemistry, organic chemistry, physical chemistry, physics, and psychology.

During the first 2 years in an osteopathic college, work is devoted chiefly to the basic medical sciences and includes anatomy (descriptive, histology, embryology, dissection), physiology, biochemistry, pathology and bacteriology, supplemental therapeutics (toxicology, pharmacology, anesthesiology, narcotics, antiseptics), and biological therapeutics (vaccines, serums, antitoxins, etc.).

The last 2 years include public health; practice of osteopathy; nervous and mental diseases; pediatrics; surgery; obstetrics and gynecology; eye, ear, nose, and throat; orthopedics; radiology; etc. A great deal of time under expert supervision is spent in the actual observation and care of patients in their homes and in osteopathic hospitals.

How Can USAFI Help a Serviceman To Prepare as an Osteopathic Physician? The United States Armed Forces Institute offers to servicemen many correspondence courses that will help in entering a preosteopathic college; for example, H152 Inorganic Chemistry, H156 Physics, X713 College Algebra; and C563 General Psychology. Offered also are self-study courses such as EM 286 Elements of Healthful Living, EM 451 Introductory College Chemistry, EM 315 College Algebra, EM 466 Physics, EM 472 The Machinery of the Body, and EM 478 Principles of Abnormal Psychology. Find out whether the osteopathic college of your choice credits these courses as preosteopathic studies before you register. In addition, a large number of college and university correspondence courses are available to servicemen through USAFI. Local off-duty classes may be set up by your educational officer.[2] For more information about the above courses, consult the latest USAFI Catalog, 1 July 1946, and your educational officer.[2]

How Can You Apply for Academic Credit for Military Experience? Most civilian educational institutions will grant credit for your military training, experience, and off-duty study. The schools and colleges will decide, however, whether or not you are entitled to credit. To apply for credit while you are still in the service, get USAFI Form 47, "Application for Credit for Educational Achievement During Military Service," from your educational officer,[2] the nearest overseas USAFI branch, or USAFI, Madison 3, Wis. Fill out the form and mail it to the school or college of your choice along with a letter indicating that you are planning to prepare to be an osteopathic physician. Also, you may ask the school or college to recommend specific courses (USAFI, Marine Corps Institute, Coast Guard Institute, or university correspondence) that will be acceptable for additional credit.

Depending on the amount of high school work you have already completed acceptably, you may work toward or possibly complete your high school diploma requirements while in service by using USAFI Form 47 and by passing such USAFI examinations or completing such USAFI courses as your high school may require. If you have finished high school, use USAFI Form 47 and write to the college of your choice asking what procedures you should follow in making application for admission and what, if any, credit will be granted. If you have already done some college work use the same method to find out if you can get credit toward your degree. For full information see the officer[2] at your station or base who handles off-duty educational activities.

If you are a veteran, use in place of USAFI Form 47 a certified copy of your separation record (Army-WD AGO Form 100; Navy-Nav Pers 553; U. S. M. C. Report of Separation; Coast Guard NavCG 553).

Where Can You Find Out More About the Work of an Osteopathic Physician and Related Education? You can get information about schools and colleges that will prepare you for the work of an osteopathic physician by writing to the American Osteopathic Association, 139 North Clark Street, Chicago 2, Illinois. Your educational officer[2] may be able to help you. Information about the work of the osteopathic physician and surgeon may be found in the Army Vocational Information Kit and Navy Occupational Information File, if one is available at your station. Veterans can get information, especially about Government financial aid for education, at the nearest Veterans' Information Center.

What Jobs Are Related to Osteopathy? You may be interested in work related to that of the osteopathic physician and surgeon and yet circumstances may not permit you to go into that profession. Related jobs usually not requiring as much training include medical-laboratory technician, X-ray technician, physical-therapy technician, occupational therapist, electrotherapist, physician's assistant, medical-social worker, nurse, or hospital dietician.

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[2] Army—Information-Education Officer; Navy—Educational Services officer, Education Officer, or Training Officer; Marine Corps—Special Services Officer; Coast Guard—Educational Officer.

Case History

W. C. ANDREEN, D.O.
Wyandotte, Mich.

LEPTOSPIROSIS
(Ratbite Fever)

A small girl, past 3 years of age, was brought in for examination June 19, 1946, with complaints of epigastric distress, some nausea, conjunctivitis, rhinitis, and periodic spells of lassitude which had become progressively worse during the previous 4 days. Her temperature had been high during the attacks.

Examination showed: temperature 103.8 F., pulse 106, urinalysis negative, red blood count 4,300,000, white blood count 16,700, hemoglobin 86 per cent. The differential white count was: eosinophils 4, stabs 15, lymphocytes 24, polymorphonuclear leukocytes 73. The throat was slightly injected, with some rhinitis, the eyes slightly swollen and injected, ears not involved, petechial patches on mucous membrane of mouth, chest negative. No region of abdominal tenderness was found, but the liver was enlarged to 1½ fingerbreadths below the costal margin. No jaundice was present.

Family history disclosed the facts that an older daughter and the father were complaining of practically the same symptoms, and that the pet dog had been taken to the veterinarian and hospitalized that day. No one had been bitten by the dog, but the children played with him.

The dog's condition was diagnosed as leptospirosis, upon dark field examination.

Blood specimens were taken from the two children, the mother and the father. Since the health departments of two cities which were called and several research laboratories did not have definite laboratory procedures available for this type of work, the veterinarian examined the specimens. The two children and the father were found to be positive and the mother negative.

Three hundred thousand units of penicillin in wax and oil, Ramansky's formula, was given every 30 hours for three doses, when symptoms became less apparent, the periods of attacks lessened, and the conjunctiva cleared. To July 27, 1946, the symptoms have not recurred, though the patients experience extreme tiredness.

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Current Osteopathic Literature

Abstracted by Esther Smoot, D.O.

CLINICAL OSTEOPATHY
42: No. 9 (September) 1946

Osteopathy, Its Use in the E.E.N.T. Division of the College Clinic. Charles A. Blind, D.O., F.A.C.O.S., Los Angeles.—p. 481.

*Total Hysterectomy Versus Subtotal Hysterectomy. Ross B. Thompson, D.O., Glendale, Calif.—p. 486.

*Importance of Proctologic Examination. Philip F. Spooner, D.O., Los Angeles.—p. 491.

Internal Derangements of the Knee. Chester H. Lyon, D.O., M.D., Los Angeles.—p. 494.

***Total Hysterectomy Versus Subtotal Hysterectomy.**—Thompson thinks that the general practitioner should know basic principles regarding choice of uterine surgery and use his judgment as well as the surgeon's. For proper treatment to be given the patient an exact diagnosis should be established before the operation. "It should be remembered that the aim of the doctor is to return the patient to a state of health as rapidly as possible at a minimum cost, and without loss of functioning tissue of value. Conservatism is the rule of treatment, yet the most radical therapy should not be avoided if by its use the life and health of the patient are assured."

Cervical biopsy should be done in every case where there is any indication of neoplasm; if negative, it is probably best not to remove cervix. Cervical cautery preceding uterine resection where the cervix is to remain is essential in cases of endocervicitis.

Fibrosis uteri is not considered "primary pathology" by some authorities who think that it is the result of physiologic activity and that the ovarian factor should receive consideration.

Because total hysterectomy is a more detailed operation than the subtotal procedure, takes more time, is more apt to occasion shock, is more liable to cause hemorrhage, or urinary complications from injury to ureters or bladder, Thompson favors the less radical operation in cases where malignancy has been ruled out. It also "allows excellent support for the remaining structures and the vaginal vault is not altered . . ." He emphasizes that the "subtotal hysterectomy requires a much more detailed preoperative management than the more radical procedure."

***Importance of Proctologic Examination.**—Spooner thinks that too few doctors give fair consideration to rectal conditions, therefore to their patients. Many times frank symptoms of rectal involvement are not reported by the patient, when by questioning the doctor could learn of symptoms indicating rectal disease. Spooner's pertinent reminders regarding rectal examination include practical details.

THE JOURNAL OF OSTEOPATHY
KIRKSVILLE, MISSOURI
53: No. 8 (August) 1946

Modern Treatment of the Tuberculous Lung. D. A. Richardson, D.O., Austin, Minn.—p. 15.

Electroencephalography in Diagnosis. W. V. Cole, B.S., D.O., Kirksville, Mo.—p. 24.

Treatment of the Anemic Condition. G. H. Kroeger, D.O., and C. A. Rohweder, D.O., Kirksville, Mo.—p. 27.

53: No. 9 (September) 1946

*Autopsy Examinations. Grover C. Stukey, B.Sc., D.O., Kirksville, Mo.—p. 13.

Working Diagnosis. Charles K. Smith, D.O., Kirksville, Mo.—p. 18.

Case Report. Gilbert H. Kroeger, A.B., D.O., Kirksville, Mo.—p 24.

***Autopsy Examinations.**—Stukey says that "the examination of the human body has become one of the most valuable sources of information concerning disease and diagnosis." Postmortem examinations afford opportunity for study of physiologic structures, review of gross anatomy, investigation of anastomoses following amputations, and practice in surgical technic. The purposes of them are to learn the true cause of death and to study the changes resulting from disease.

No autopsy should be arranged unless proper authority has been granted. The greatest tact should be exercised in securing permission, which should be given in writing and signed by the person who has that authority, in the presence of two witnesses. A copy of the form for this used by the K.C.O.S. is incorporated in the paper.

The autopsy personnel is an important factor. It is advisable for the pathologist to have one or more trained assistants, and in medicolegal cases it is well to invite other professional friends to be present to help shoulder responsibility "in case the evidence obtained may serve to convict a person of crime." The mortician may be of important service to the operator and should be invited to be present. Invitations should be extended by the physician in charge who will have consulted with the family. It is preferable that members of the family and friends not attend.

The autopsy should be done as soon after death as state laws and convenience of those to be present will permit.

If examination must be delayed, the body should be placed in refrigeration. Good daylight from the north is acceptable light. Stukey lists instruments necessary in most autopsies. Especially in medicolegal cases a secretary should be employed to take accurate notes, which will be beneficial to the operator in making the anatomical diagnosis upon completion of the operation.

Stukey says that at the beginning of the postmortem examination all available clinical data should be reviewed. He goes into detail regarding the superficial examination, opening the body, incisions to use, order of examination, what to look for, and evaluation of findings.

Current Medical Literature

Abstracted by Katherine Becker, B.A.

CAUSES OF BREECH PRESENTATION

A study of breech presentation made by Pendleton Tompkins, M.D., appeared in the May 1946 issue of *American Journal of Obstetrics and Gynecology*. The study was based on 911 single "primary" breech presentations at the Philadelphia Lying-In Hospital during a 10-year period beginning January 1, 1933. There were 25,170 deliveries during the period, 1184 being breeches. The 911 studied represent those remaining after breech deliveries following podalic version and those in multiple pregnancies were excluded. Multiple pregnancy was not dealt with since it undoubtedly predisposes to the breech presentation of one baby.

Prematurity, says the writer, is an important factor in breech presentation. Since the incidence of breeches is greatest among infants weighing less than 2,500 grams (5½ pounds) and since this weight is commonly accepted as the dividing line between maturity and prematurity, most of this study is concerned with babies weighing more than 2,500 grams. Attention is called to the fact that the inclusion of smaller babies in hospital statistics increases the proportion of breeches and may account for the variation in incidence in various clinics.

Multiparity has been given as a cause of breeches. The writer's statistics do not confirm the point. A statement is quoted that the incidence of breeches occuring in the first pregnancy is 3 per cent and 3 per cent in each subsequent pregnancy. It follows that the woman who has the greatest number of children will have the greatest number of breeches. It appears that some patients have an individual tendency to bear breech babies and that there are hereditary tendencies to breech presentations.

According to Tompkins contracted pelvis is an old explanation for breech presentations and not a very sound one. Gross fetal abnormalities are often associated with breeches. However, neither hydrocephalus, anencephalus, nor other gross abnormalities play a very great part in producing breech lie in a large series of cases. While placenta praevia is another stated factor in breech births, only 8 cases were recorded among 677 breech births. Pelvic tumors are a reputed cause of breech presentations, but they were recorded as the cause in only 0.6 per cent of cases in this series. Uterine anomalies, particularly bicornate uterus, are often associated with faulty presentation, but only 4 cases were observed in this series of 677 cases. In considering uterine scars as a cause, it was found that among 100 women with cesarean scars, only one had a breech lie when the second cesarean was performed. While maternal obesity is an alleged cause of breeches, available statistics do not bear out the allegation. Data seem to indicate that older primiparas have a greater than average tendency to breech presentation. Polyhydramnios is reputed to be responsible for breeches, but the writer deems the definition of polyhydramnios so indefinite that statistics are unreliable. Furthermore fetal malformations are so frequently associated with excessive fluid that it would be difficult to determine which factor was primarily responsible.

In summarizing the writer shows that in his series the classically recognized factors of breech presentation: "contracted pelvis," fetal and uterine anomalies, placenta praevia and pelvic tumors, account for only about 15 per cent of cases where babies weighed more than 5½ pounds and about 20 per cent of cases where babies weighed less than 5½ pounds. In attempting to discover the unrecognized factors at work in the remaining cases, the writer considers fetal activity, extended legs and cord complications.

While fetal activity is seldom mentioned in the etiology of type of presentation, when relative inactivity is reported, the baby is often found in breech presentation. Tompkins states that it is reasonable to believe that maimed babies with impaired powers of motion and babies whose movement is limited by extension of the legs would have less chance of extricating themselves from a breech lie than vigorous babies with flexed legs. The typical posture of the fetus at 1,500 grams or about 32 weeks of gestation is depicted as being one of extreme flexion. Possibly full extension of the legs occurs freely at this period. If it happens that the amniotic fluid suddenly escapes the uterus will contract and the fetus be caught and delivered in his presentation of the moment. If premature labor does not occur, the fetus will increase in size and vigor while the space available for movement of the extremities decreases. Once the legs are extended, they return to the flexed position with difficulty. At term about 97 per cent of babies are cephalic and about 3 per cent breech. Since the incidence of flexed legs is high among cephalic babies and low among breeches, the writer considers it reasonable to assume a causal relation between extension of the legs and breech presentation. Cord complications, such as short cord or coils around the extremities, may account for some breeches by interfering with spontaneous version. With reference to to the matter of recurrent breech presentations the writer says that it is as easy to believe that babies born of the same mother may have similar peculiarities of structure or uterine activity which account for their type of presentation as to believe that they are entirely due to anatomic or physiologic characteristics of the mother.

Tompkins concludes his paper with the expression of the hope that he will in a few years be able to report current experiments which deal with the effects of gravity and the contour of the fetal mass on polarity.

PROTEIN DEFICIENCY IN MAN

Malnutrition, says Melville Sahyun, Ph.D., writing in the *American Journal of Digestive Diseases*, March 1946, is particularly widespread with decreased natural resources of foodstuffs brought about by wars and by economic conditions. Protein deficiency is demonstrable not only among undernourished but also among well-to-do individuals who have neglected their dietary requirements of proteins and accessory factors.

Protein requirements, states the writer, are much higher in infancy and adolescence than in adulthood. Infants up to the age of 1 year require as much as 3 to 4 grams of protein per kilogram of body weight. Girls and boys up to the age of 20 require a high protein allowance for growth as well as for maintenance. Their need for fats and carbohydrates is also high. Man's protein requirement after the age of 20 becomes fairly constant, being about 70 grams daily for a man weighing 70 kilograms. Man's protein requirement in old age has not been fully established, but there are opinions that it should not be as great as earlier in life because of absent or defective teeth, inadequate gastric and pancreatic secretions, impaired absorption, constipation and other physiological disorders.

The early symptom of protein deficiency is negative nitrogen balance, which is accompanied by loss of appetite, loss of weight and a general feeling of fatigue. The early stages of protein deficiency are not recognizable by simple laboratory diagnostic procedures, says Sahyun. Values for hemoglobin and plasma proteins may still be within the normal range. The only accurate measure is made by nitrogen balance studies.

True hypoproteinemia is an advanced stage of protein deficiency and indicates that not only the blood serum protein level, but that of tissue or reserve proteins as well, is considerably below normal. The disturbed metabolism which involves amino-acid production and globulin synthesis decreases resistance to infections. The history of epidemics reveals that under conditions of war, imprisonment and famine, nutritional edema is frequent and is associated with beriberi. This type of edema disappears when the victim is given adequate food

(Continued on page 204)